

HYDROgen

Software for the programming of test procedures



Manual

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1 Introduction

1.1 Range of validity

The manual on hand is valid for software packages named **HYDROgen**, manufactured by Hydrotechnik GmbH, Limburg (Germany). The manual is only valid for software with the same version number like indicated on the title page.

If you do not have the manual that corresponds with your software version, you should not hesitate to contact the Hydrotechnik homepage or your local Hydrotechnik partner or distributor.

1.2 Scope of this manual

The manual shall support the user during his daily work with the software package. It contains information on the dialogs, commands and buttons of the software and explains certain procedures and operational actions. For information exceeding the contents of this manual, you may book customer-specific trainings at one of the Hydrotechnik locations or in your rooms. Please contact our sales staff or your local Hydrotechnik partner or distributor for more information.

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1.5 Use as agreed

The software package **HYDROgen** is used to program individual test routines that can be used within or with suited Hydrotechnik measuring instruments. The software can be installed with the operating systems Windows™ 98, 2000, ME, XP and Vista. In any case of question, or if you want to use the software for a different purpose, please do not hesitate to contact our customer service staff.

1.6 Warranty regulations

The media on which you receive Hydrotechnik software are warranted not to fail to execute programming instructions, due to defects in materials and workmanship, for a period of 90 days from date of shipment, as evidenced by receipts or other documentation. Hydrotechnik will, at its option, repair or replace software media that do not execute programming instructions if Hydrotechnik receives notice of such defects during the warranty period. Hydrotechnik does not warrant that the operation of the software shall be uninterrupted or error free.

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In any application, including the above, reliability of operation of the software products can be impaired by adverse factors, including but not limited to fluctuations in electrical power supply, computer hardware malfunctions, computer operating system software fitnee, fitness of compilers and development software used to develop an application, installation errors, software and hardware compatibility problems, malfunctions or failures of electronic monitoring or control devices, transient failures of electronic systems (hardware and/or software), unanticipated uses or misuses, or errors on the part of the user or applications designer (adverse factors such as these are hereafter collectively termed "system failures"). Any application where a system failure would create a risk of harm to property or persons (including the risk of bodily injury and death) should not be reliant solely upon one form of electronic systems due to the risk of system failure. To avoid damage, injury, or death, the user or application designer must take reasonably prudent steps to protect against system failures, including but not limited to backup or shut down mechanisms.

Because each end-user system is customized and differs from Hydrotechnik testing platforms and because a user or application designer may use Hydrotechnik products in combination with other products in a manner not evaluated or contemplated by Hydrotechnik, the user or application designer is ultimately responsible for verifying and validating the suitability of Hydrotechnik products whenever Hydrotechnik products are incorporated in a system or application, including, without limitation, the appropriate design, process and safety level of such system or application.

2 Installation



Information

HYDROgen is the successor of the software **PAGS**, the unique tool for the generation of automatic test routines, proven since 1991. The related software tool **HYDROrun** is the successor of the software **PASS** for the execution of the programmed test routines on computers and measuring instruments.

2.1 System requirements

Installation and execution of the software package **HYDROgen** is possible on nearly all computer systems. We support the Windows™ versions 98, 2000, ME, XP and Vista.

2.2 Install the software

1. Insert the CD containing **HYDROgen** into the drive.
2. Open the directory „HYDROgen“.
3. Double-click the file „Setup.exe“ to start the installation.
4. Wait until the installation has been terminated.
5. You should now be able to see a link **HYDROgen** on the desktop of your PC.

3 Run the software

3.1 Launch software

1. Double-click the **HYDROgen** link on your desktop.
2. Wait until the main screen is displayed.

3.2 Main screen



Pic. 1 Main screen

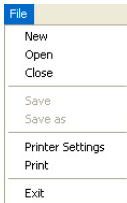
After launching the software, the working area is empty, but the most important elements are displayed:

- | | |
|--------------|---|
| Title bar | shows the names of the application and of the active file, after a file has been opened |
| Menu bar | shows the available operation menus |
| Icon bar | use the icons to get access to the most important functions |
| Working area | the currently selected component is displayed |
| Program list | the current test program is shown as a schematic list here |
| Status bar | shows information on the system or the current function |

3.3 Menus and functions

In the following, all menus and the contained functions are explained chronologically. If an icon is provided for a function, it will be shown in the corresponding section. Later in this manual we give an overview on all icons and their functions.

3.3.1 File menu

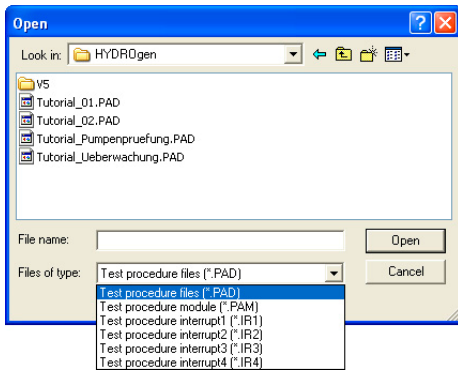


Pic. 2 File menu

New

Creates a new test program file and displays the first (empty) component on the working area.

Open



Pic. 3 File – Open

Use this dialog to open suited files. Navigate to the desired directory and click on the file to be opened. Then click on one of the buttons:

- Open** opens the file and loads the corresponding data
- Cancel** aborts and closes the dialog

After opening the selection list “Files of type” you can select the file type that shall be displayed. These file types can be opened:

- PAD** test routine file; these files contain complete test routines
- PAM** test routine module; these files contain groups of one or several components that can be inserted into test routines at one or several places
- IR1** interrupt routine 1; these are special components or groups of components programmed for cyclic routine tasks and can be integrated into test routines
- IR2** interrupt routine 2
- IR3** interrupt routine 3
- IR4** interrupt routine 4

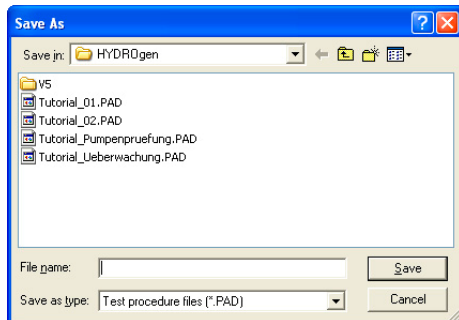
Close

Closes the opened file. If there are changes that had not been saved, a dialog will be displayed prior to closing, whether the changes shall be saved, or not.

Save

Saves the current file. If the file has not been saved before, the dialog from the function „Save as“ (see below) will be displayed.

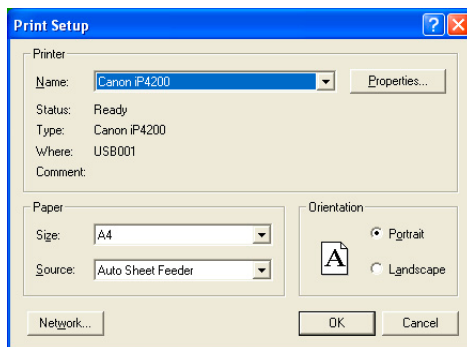
Save as



Pic. 4 File – Save as

Here you can navigate to the desired storage location for the opened file, and select or enter file type and name. The different file types are explained in the section „File – Open“ (see above). Click on “Save” to store the file.

Printer settings



Pic. 5 File – Printer settings

Opens the dialog for printer setup. This dialog depends on your operating system and may differ from the image shown here. Explanations to this dialog are contained in the help of your operating system.

Print

This command opens the operating system specific print dialog. Select a printer and set all options to print the file.

Exit

Use this command to terminate **HYDROgen**. If there are data that have not been saved, you will be requested to save them.

3.3.2 Edit menu



Pic. 6 Edit menu

Undo

Undoes the last command (short command: [Strg] + [z]).

Cut

Copies the current component into the clipboard and deletes it at the current position ([Strg] + [x]).

Copy

Copies the current component into the clipboard ([Strg] + [c]).

Paste

Inserts the component from the clipboard into the test routine, in front of the current component. If there is no component in the clipboard, a new component is inserted in front of the current component and the dialog "Component selection" (see Pic. 7 on page 11) will be displayed ([Strg] + [v]).

Change

Opens the dialog for the selected component to give you the opportunity to do changes.

Delete

Deletes the current component.

Append 

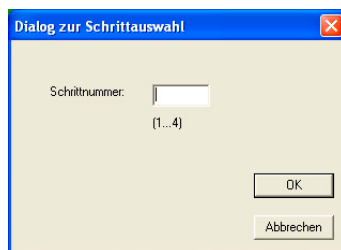
Adds a new component to the last component of the test routine. After selecting the command, this dialog will be displayed:



Pic. 7 Select component

Here all the 26 components are contained, with which all test routines can be assembled. Click on the icon of the component that you want to insert prior to the current (command "Paste") or after the last component of the test routine (command "Append"). Please see chapter 4 on page 20 for explanations on the components.

Go to 

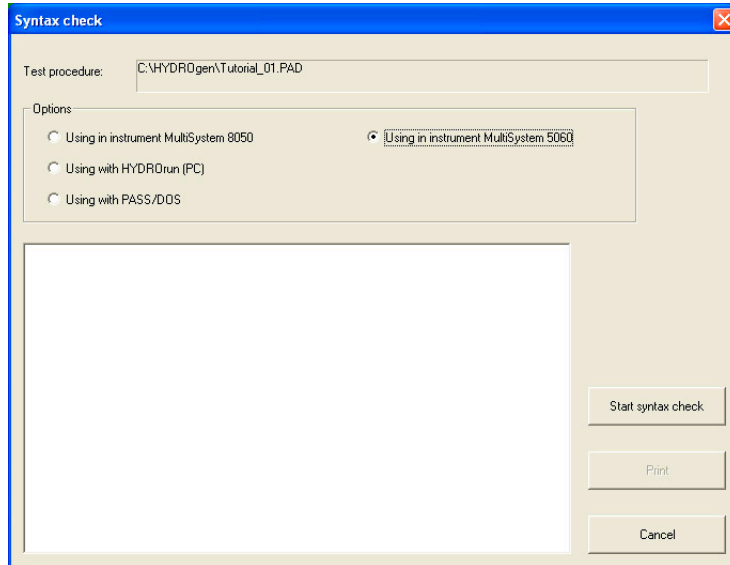


Pic. 8 Dialog "Go to"

Here you can enter the number of a component (step within the test routine). After clicking on [OK], this component will be displayed as the current component.

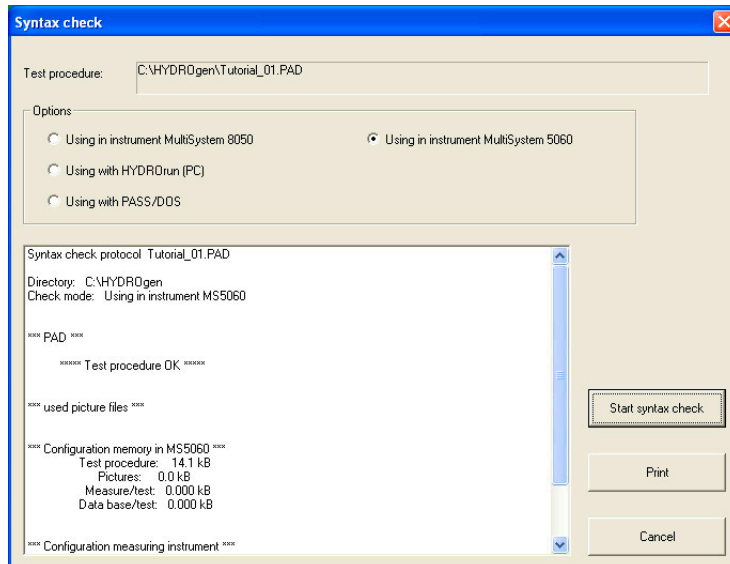
Preliminary test

Here you can run a syntax test at any time. In this test dependencies between the used components, and limitations corresponding the use in the desired measuring instrument are checked. The test does not check, whether the desired effect can be gained with the programmed test sequence. After clicking on "Preliminary test" you will be asked, whether the test routine shall be saved. Then this dialog will be displayed:



Pic. 9 Preliminary test dialog

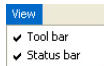
The file to be checked with the preliminary test is displayed in the upper part of the dialog. Beneath you have to select in the "Options" section, how the test procedure shall be used. Check the desired option and then click on [Start syntax check]. The result will be displayed after a few seconds:



Pic. 10 Preliminary test result

The test report is displayed in the white window area. It contains several information on the test procedure, the used images, and the configuration of memory and measuring channels. Click on [Print] to print the test report. Click on [Cancel] to close the dialog.

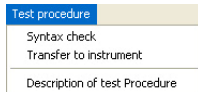
3.3.3 View menu



Pic. 11 View menu

Here you can select, whether the tool bar (buttons) and the status bar (at the lower edge of the window) shall be displayed, or not.

3.3.4 Test procedure menu



Pic. 12 Test procedure menu

Syntax check

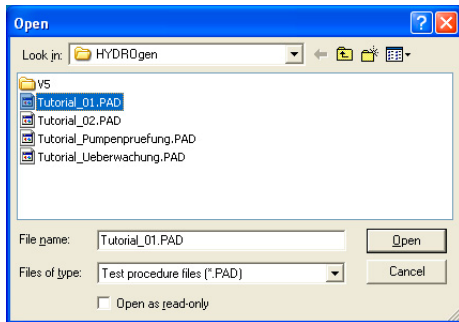


Information

The funktion „Syntax check“ is only available, if no file is opened.

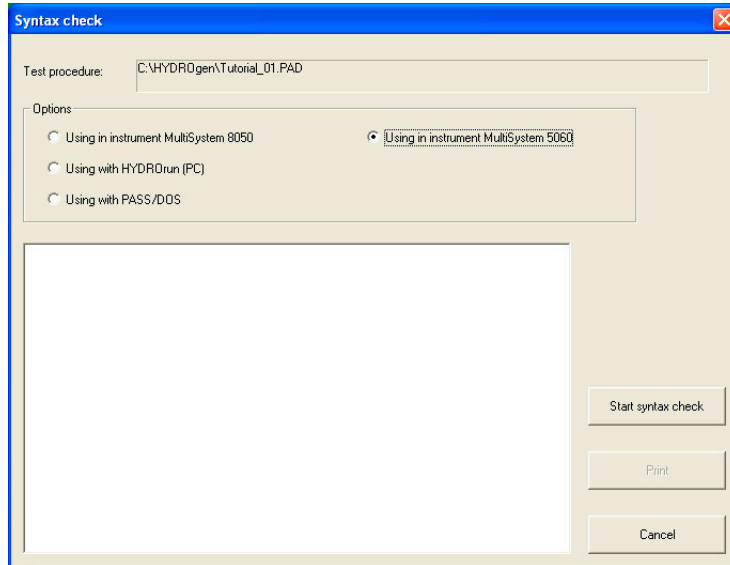
Here you can execute a syntax check for a saved test procedure file. During the test, the dependencies between the used components, and limitations concerning the use in the desired measuring instrument are checked. The test does not check, whether the desired effect can be gained with the programmed test procedure.

Close the active file and then click on „ Test procedure – Syntax check“. This dialog will be displayed:



Pic. 13 Open file for syntax check

Highlight the desired file and then click on [Open]. This dialog will be displayed:



Pic. 14 Syntax check dialog

The further procedure corresponds with the preliminary test like described in the section „Preliminary test“ in chapter 3.3.2 starting on page 10.

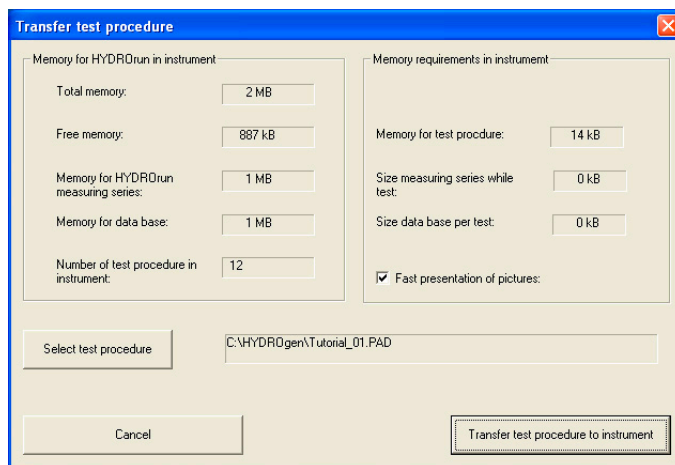
Transfer to instrument



Information

The function „Transfer to instrument“ is only available, if no file is opened and a measuring instrument is connected to the computer. You must have a valid **HYDROrun** licence for this instrument.

You can use this function to transfer a test procedure to a connected and enabled measuring instrument. Before you have to run the syntax check for that type of measuring instrument, then you can select the command “Test procedure – Transfer to instrument”:



Pic. 15 Transfer to instrument dialog

The upper part of the window shows information on the **HYDROrun** memory available in the measuring instrument, and the required memory for the transfer of the selected test procedure. Check the option "Fast presentation of pictures" to enable the automatic image resolution reduction, what accelerates the image processing without reducing the image quality observably.

You can also click on "Select test procedure" to choose another file for the transfer. Then click on "Transfer test procedure to instrument" to start the data transmission.



Information

The button „Transfer test procedure to instrument“ is only active, if you have a valid **HYDROrun** licence for your instrument. In any case of question you should not hesitate to contact your Hydrotechnik partner.

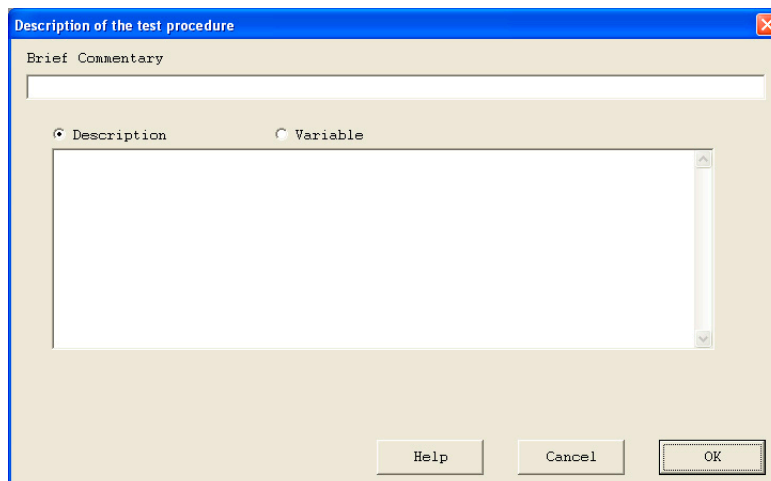
Description of test procedure



Information

The function „Description of test procedure“ is only available, if a file is opened.

It may be useful to assign a description to the test procedure, where important information can be given to future users. Select the command "Test procedure – Description of test procedure":



Pic. 16 Enter description of test procedure

Here you can write a brief commentary into the corresponding entry box and use two more possibilities:

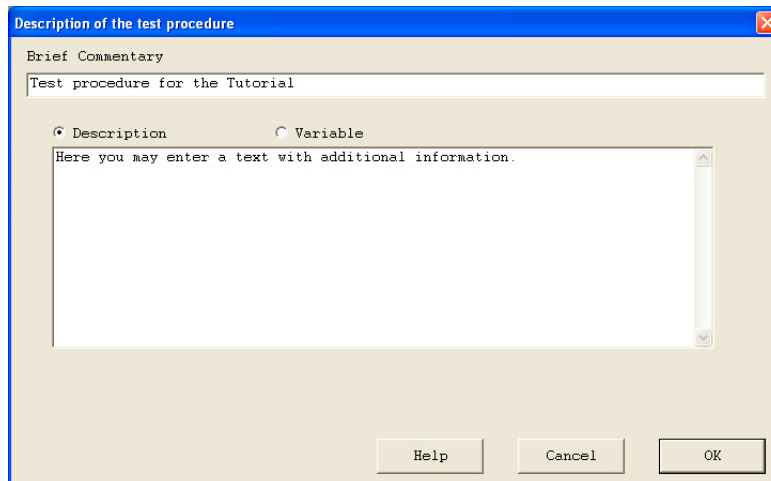
- Description allows you to enter text into the large entry box
- Variable allows you to enter explanations to the used variables

Check the desired option and then enter the desired text.



Information

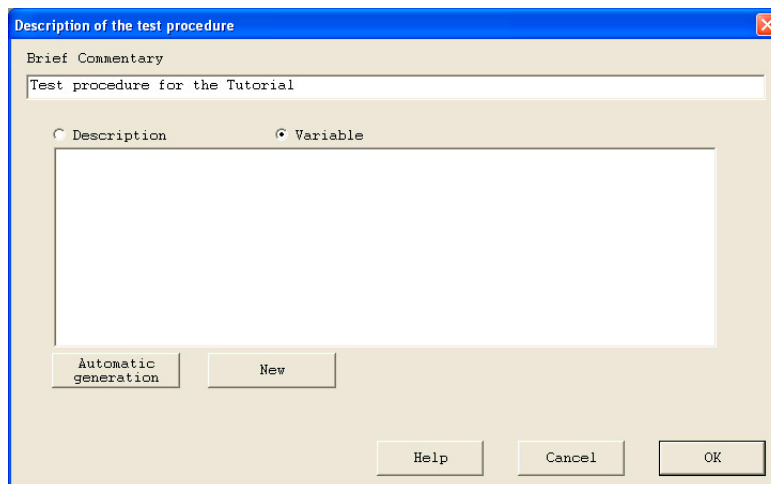
The brief commentary will be displayed in the measuring instrument within the **HYDROrun** test procedures selection list.



Pic. 17 Enter a descriptive text

Add information to the variables

After enabling the option „Variable“, two new buttons will be displayed:

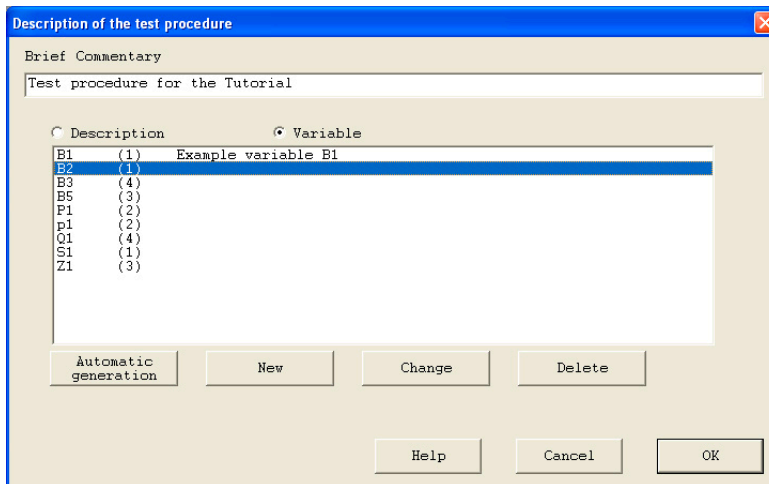


Pic. 18 Add descriptions to the variables

Automatic gener. generates a list of all variable used in the test procedure; then you can add description to the variables

New opens a dialog where you can define a variable with description on your own

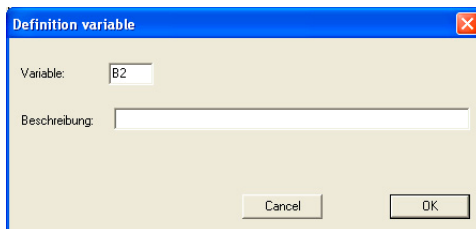
If variables are defined or after a click on „Automatic generation“, a list of all variables will be displayed. Click on a variable to highlight it and two more buttons will be shown:



Pic. 19 List of the variables

Change opens a dialog for the highlighted variable, where you can enter or edit a description
Deletes deletes the highlighted variable from the list

By clicking on „New“ or „Change“, this dialog will be opened:



Pic. 20 Enter description of a variable

If you edit an existing variable, the description will be displayed and can be overwritten. When defining a new variable, you will have to enter the description. Then click on “OK” to save the description.



Information

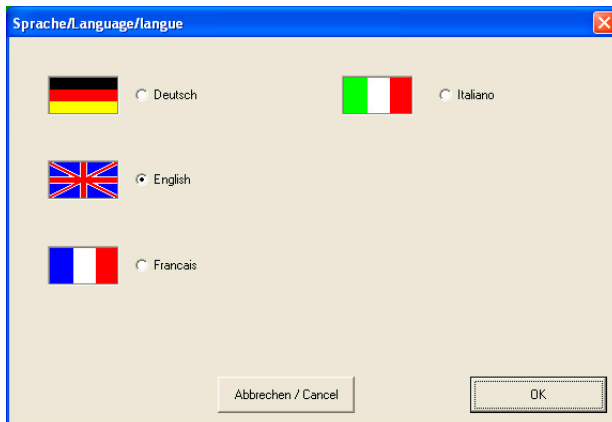
When using the functions „New“ or „Delete“, you should run the function “Automatic generation” after finishing the test procedure. This checks the list of variables and you can see, whether you have skipped variables or if variables are defined that are not used in the test procedure (number in brackets is null).

3.3.5 Extras menu



Pic. 21 Extras menu

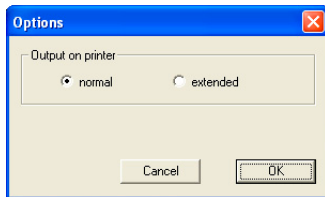
Language



Pic. 22 Select operation language

Check the desired language option and then click on [OK].

Options

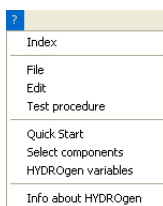


Pic. 23 Options

Here you can choose, whether the printing shall be done in normal size, or extended. The best way is to try both settings and then use the option that fits best with your requirements. Then click on "OK".

3.3.6

? menu














Pic. 24 ? menu

This menu gives you access to the help and information functions integrated into the software.

3.4 Icons in the tool bar

This section contains a short reference of the available icons. The complete explanations of the commands and functions are contained in section 3.3 „Menus and functions“.

-  creates a new test procedure file
-  opens an existing test procedure file
-  copies the current component into the clipboard and deletes it from the test procedure
-  copies the current component into the clipboard
-  inserts the component in the clipboard into the test procedure, in front of the current component
-  opens the current component for editing
-  deletes the current component
-  adds a component to the test procedure
-  jumps to the desired component
-  prints the current test procedure
-  displays the version number of the application

4 Components

The components are the heart of **HYDROgen**. You do not need programming knowledge to assemble an individual test sequence with them that can be used to execute complex test tasks or standardized procedures with Hydrotechnik measuring instruments.

In this chapter, all available components are shown and explained in detail, Their specific use will then be depicted in the subsequent chapter with examples.

The components are combined in six groups:

- Presentation
- Measure and control
- Calculation
- Data base
- Running
- Special functions

4.1 General component parameters

There are several parameters that are contained in all components and always have the same meaning. These are explained here:

- Input condition
- Component number
- Comment
- Branch condition
- Target

Input condition

You may enter a condition to obtain that the component will be executed (condition is fulfilled) or skipped (condition is not fulfilled). But you can only use simple comparisons of variables.

If you want to use disjunctive or conjunctive linkings of several logical formulas, you should use a logic component, where a logic variable is set due to the result of the formula. In the current component, you then either enter "Bn" (logic variable is TRUE) or "!Bn" (logic variable is FALSE). The "n" is the number of the logic variable (e.g. B2).

Limitations

- only variables with the same type may be compared; that means text variables (S) only with other text variables or texts, counter variables (Z) only with other Z-variables or integers
- texts must be written in quotes (e.g. S1="Y")
- when comparing texts or text variables, you may only check for equality or disparity, small and capital letters can be neglected
- floating point variables and constants should not be checked for equality, since inaccuracies may occur in the internal format and therefor the condition can never be fulfilled

Relational operators

- = equality
- != disparity
- ! not-operator (only in combination with logical variables)
- < smaller
- > bigger
- <= smaller/equal
- >= bigger/equal

More possible conditions

CONTINUE	condition fulfilled, if key „CONTINUE“ (or F8) has been pressed
!CONTINUE	condition fulfilled, if key „CONTINUE“ (or F8) has not been pressed
INFO	condition fulfilled, if key „INFO“ has been pressed; this allows you to realize additional information screens that will only be displayed, after the user has pressed the key “INFO”
MEMORY	condition fulfilled, while storing is active
!MEMORY	condition fulfilled, while no storing is active

Component number

Each component automatically receives a consecutive number when inserted into the test procedure. This number cannot be edited. If components are added or inserted, the numbers will be adapted automatically.

Comment

Here you can enter a text with the maximum of 50 digits that will be displayed during the execution of the component.

The entry is not worthwhile for every component. Some will be processed very shortly, the comment cannot be read then. In other components (e.g. time, input/output, measure) you can use the comment to provide useful information for the user.

Branch condition

By defining a branch condition you can jump to another component, if the defined condition is fulfilled. For the branch condition, the same definitions and limitations are valid like for the input condition (see page 20).

If the defined condition is fulfilled, the program sequence will be continued with the component entered in the box “Target”. If “1” is entered as branch condition, the program will always be continued with the component entered in the “Target” box. If no branch condition is defined, the following component will be processed.

Target

Enter the number of the component, where the program sequence shall be continued when the branch condition is fulfilled. You may enter the number of a prior, or the current component.

Buttons

At least three buttons are available in all components:

Help	opens the help menu for this component
Cancel	ends the definition or editing of the component without saving the entries
OK	saves the defined or edited component

4.2 Presentation

Here eight components are available:

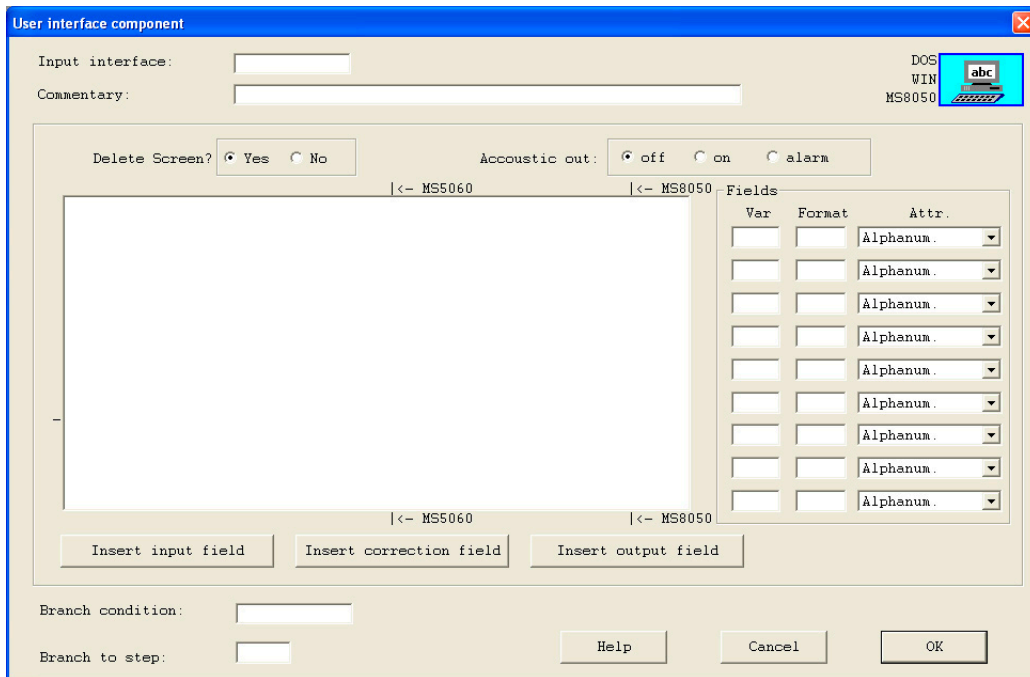
- Input / output
- Display
- Image
- Graphic
- Diagram
- Text protocol
- Graphic protocol
- Online graphic
- Options
- Fonts

4.2.1 Input / output component



The input / output component is used to control the complete interaction between user and test procedure. It is used to create menus and input masks, and to take over entries and commands. It is used for

- to display information
- to alarm in critical situations
- to take over entries of the user



Pic. 25 Input / output component

Delete screen?

- Yes the screen of the executing device will be cleared before the component is displayed
- No the screen will not be cleared; this allows to display the content of several input/output components at a time; this could be interesting, if you want to create a large mask that cannot be handled with a single component, or if more than nine input/correction/output fields shall be used

Acoustic output

- off no acoustic output
- on a short beep will be emitted when the component is executed
- Alarm an alarm signal will be emitted when the component is executed that can only be ended by pressing a key



Information

At the Hydrotechnik measuring systems, beeps and alarm signals will be replaced by a blinking icon.

4.2.1.1 Mask area

The large, white window section shows the mask, where you can place the elements of the component. Dependant on where the test sequence shall be executed, you can use different space:

MultiSystem 5060	16 lines, each with 38 digits
MultiSystem 8050	20 lines, each with 72 digits
PC	22 lines, each with 72 digits

There are markers at the edge of the window section that ease the entry for the measuring instruments MultiSystem 5060 and 8050.

Usable digits

You may use all ASCII digits. Special digits that are not available at the keyboard can be written by entering their decimal value while the ALT key is pressed. Please see the documentation of your operation system for a table with all the ASCII digits.



Important

Two special digits may not be used: ALT-174 («) defines the first position of an input field, ALT-175 (») the first position of an output or correction field.

User-friendly masks

You can define the maximum of nine fields (input/output/correction) in a mask, since only a limited segment of the component data is reserved for the definition of the mask. It is possible but not recommended to display several masks at a time without deleting the screen, to create the impression of a large mask. Such masks are normally not user-friendly and should only be used, if it is absolutely required.

When a mask shall have more than nine fields, you may separate the input and output fields. For instance you may display the input field mask with one or several components, and then the output fields.

4.2.1.2 Fields

You have to define three parameters for each field that you have entered into the mask. This is done in the input boxes right of the mask area. The order of the fields in the mask must correspond with the order of the fields in this list.

Variable

Here you define, which type of variable shall be used. Each variable is specified by one to three letters and a number. The table contains all possible variables:

Input variables	
S1 ... S255	text variables
W1 ... W255	value variables for floating point numbers
Z1 ... Z255	counter variables for integral values
Output variables	
S1 ... S255	text variables
W1 ... W255	value variables for floating point numbers
Z1 ... Z255	counter variables for integral values
B1 ... B255	logic variables
E1 ... E96	status variables of the digital inputs (output „N“ for 0 and „J“ for 1)
A1 ... A96	status variables of the digital outputs (output „N“ for 0 and „J“ for 1)
MAX1 ... MAX8	maximal values
MIN1 ... MIN8	minimal values
AM1 ... AM8	arithmetic mean values
QM1 ... QM8	square mean values
SA1 ... SA8	standard deviations
DT	date
TM	time
Examples for the definition of measurands	
T1 ... T16	temperature
p1 ... p16	pressure
Q1 ... Q16	volume flow
n1 ... n16	rotational speed
U1 ... U16	voltage
I1 ... I16	current
M1 ... M16	torque
F1 ... F16	force
v1 ... v16	speed

Format

With this parameter you define the length of input fields or the format of output or correction fields:

- enter a value between 1 and 60 with input and output fields; but please consider the available width of the display, especially when the use of the MultiSystem 5060 is planned
- when numerical values shall be issued, you can define the number of digits left and right of the decimal point, but not more than nine digits, each; if required the displayed value will be rounded; if there are not sufficient digits left of the decimal point, a ">" will be displayed; for invalid or infinite values a "?" will be displayed

Variable	Internal value	Format	Displayed value
W1	153.126	3.2	153.13
		3.3	153.126
		2.3	>3.126
S2	1102-53-100007	8	1102-53-
		14	1102-53-100007
W2	-	7.7	?
Z1	120	1	>
		2	>0
		3	120
TM	current time	5	11:20
		8	11:20:37
		12	11:20:37:372
DT	current date	6	31.01.
		10	31.01.2008
E1	digital input	1	J or N

Field type

In the drop-down field you can select the type of the defined field. For input fields you can choose between:

- Letters only letters may be entered
- Digits only integral numbers can be entered
- Numerical only numbers can be entered
- Alphanumerical numbers and letters can be entered

For output fields you can choose from:

- left the output is shown left-aligned
- center the output is shown centered
- right the output is shown right-aligned

Additionally you can choose the type „Correction field“. This can be used for a field that shall be input and output field, as well. The contents of the variable will be shown left-aligned, then the displayed value can be overwritten (corrected). The field is an alphanumeric input field for text (S1 ... S255), or numeric input field for the variables W1 ... W96 or Z1 ... Z255.

4.2.1.3 Buttons

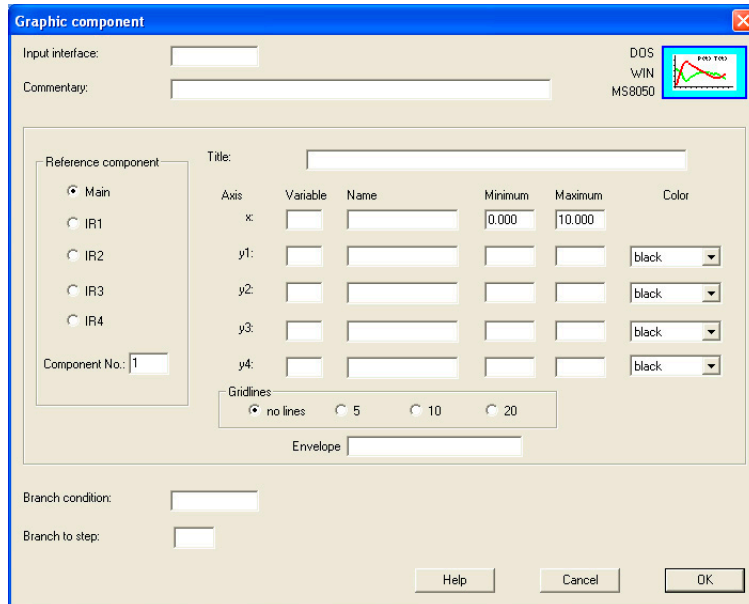
Beside the seven standard buttons, you can use three more in this component:

- Insert input field places an input field at the position of the cursor
- Insert correction field places an correction field at the position of the cursor
- Insert output field places an output field at the position of the cursor

4.2.2 Graphic component



Use the graphic component to display values in a x/y coordinate system. The axes can be chosen freely, the maximum of four curves can be overlaid. Additionally you can define one or several envelope or reference curves.



Pic. 26 Graphic component

Reference component

The graphic component will always take reference to stored measured or calculated values. Therefore it is required to enter the number of the component, where the values shall be received from. This can be a component of the test sequence ("Main"), or an interrupt routine („IR1“ ... „IR4“). „Main“ is always a component of the current file, independent whether it is a test sequence file *.pad, or a test sequence module *.pam.

Choose the desired option and enter the number of the component into the input box.

Title

Enter the text that shall be displayed as the title of the graphics.

Variable

Enter the variables that shall be displayed on the x- or y-axis. You can use all measurands, counter variables (Z1 ... Z255), value variables (W1 ... W255) and the time (t). Up to four variables can be displayed on the y-axis simultaneously, their curves will be displayed as overlays.

Name

Enter the names of the variables (e.g. the dimension unit) to display them as labels of the axes.

Minimum / Maximum

The axes can be scaled by entering reasonable values. Consider that the limits are not too narrow, values smaller than the minimum or larger than the maximum value will not be displayed.

Color

You can assign colors to the variables displayed at the y-axis.

Grid lines

Select whether none, or the shown number of grid lines shall be displayed in the background of the graphic.

Envelope curve

Enter the file name of the envelope or reference curve that shall be displayed together with the values.

Excursion

A envelope or reference curve can be created with a standard text editor. You can also use a MWF measurement file from HYDROcom. This must be converted into the TXT format and then processed manually. The TXT file must have the following format:

```
<ColumnX>[Tab]<ColumnY1>[Tab]<ColumnY2>[Tab]...<ColumnY8>
```

It must comprise at least one x- and one y-column. The first line is the head of the column with several parameters, then the data lines follow. HYDROgen supports the maximum of 1,000 data lines, that means max. 1,000 reference points. You can define the maximum of eight reference curves in one file.

The following parameters must be defined in the head of the column, separated by commas:

```
Y<No>,<Type>,<Color>,<Pensize>
```

<No> consecutive number of the curve (1 ... 4)
 <Type> type of the curve (MIN = minimal, MAX = maximal value curve)
 <Color> number of the color in which the curve shall be displayed
 <Pensize> thickness of the displayed curve line (>=1)

The parameters <No> and <Type> are required to enable a test, whether the measured value curve is located in the range between the minimal and maximal value curve.

Example of a curve file

X	Y1,MIN,12,3	Y1,MAX,12,3
10	90	100
110	80	90
115	40	80
120	10	70

This defines two envelope/reference curves for the variable Y1 (MIN and MAX). Both curves use the color 12 and are 3 pixels thick. Four reference points are defined for the curves, in the graphic, these points will be connected with lines.

Color numbers

0 black	1 blue	2 green	3 cyan	4 red
5 magenta	6 brown	7 light-grey	8 dark-grey	9 light-blue
10 light-green	11 light-cyan	12 light-red	13 light-magenta	14 yellow

4.2.3 Picture component

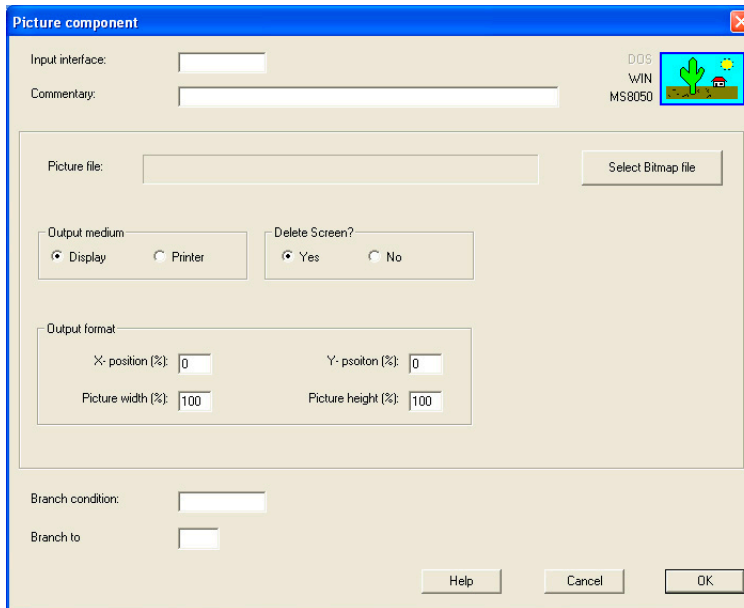


Important

This component is not available for the DOS version of **HYDROrun** (PASS). Test sequences for measuring instruments may only contain bitmap images (*.bmp).



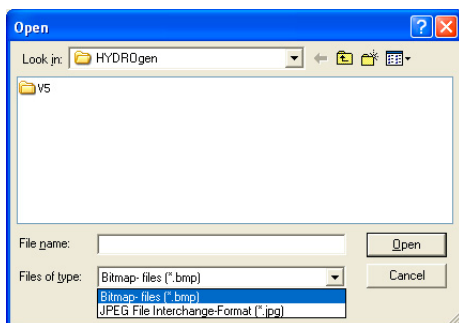
Use the picture component to add an image to the test sequence.



Pic. 27 Picture component

Selection of picture file

Click on the button to select the image file:



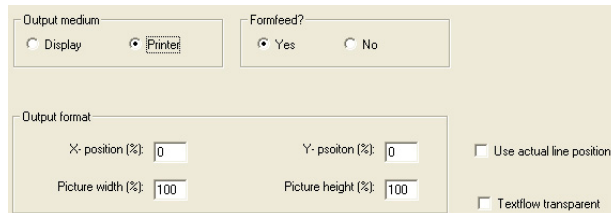
Pic. 28 Image selection

Navigate to the directory, where the desired image file is contained. Highlight the file and then click on „Open“. You can use image files in the formats *.bmp or *.jpg.

Output

Dependant which option is activated, the image will either be sent to a printer or to the screen of the executing device. If "Printer" is enabled, the dialog will change a little:

Je nachdem, welche Option Sie aktiviert haben, wird das Bild entweder nur auf einen Drucker, oder auf den Bildschirm des ausführenden Gerätes ausgegeben. Ist „Drucker“ aktiviert, verändert sich der Dialog ein wenig:



The screenshot shows a dialog box with the following elements:

- Output medium:** Two radio buttons, "Display" (unselected) and "Printer" (selected).
- Formfeed?:** Two radio buttons, "Yes" (selected) and "No" (unselected).
- Output format:** A section containing:
 - X-position (%): Input field with "0".
 - Y-position (%): Input field with "0".
 - Picture width (%): Input field with "100".
 - Picture height (%): Input field with "100".
 - Use actual line position: Unchecked checkbox.
 - Textflow transparent: Unchecked checkbox.

Pic. 29 Picture component – output to printer

Delete screen? / Page feed?

Select whether the screen shall be deleted before the picture is displayed (output to screen), or if a page feed shall be triggered after printing the picture (output to printer).

Output format

Here you can define the display or print position of the picture. Enter a percentage of the screen or page size that determines, how far the upper left corner of the image shall be shifted away from the upper left corner of the screen (or print page). If you enter a value that is too big, the picture will possibly be cut.

Additionally you can downsize large pictures by entering percentages for width and height of the picture. If you enter differing values, the picture will be displayed distorted.

Use current line position

By enabling this option (with output to printer, only), the picture will be printed at the current writing position of the printer.

Text flow transparent

By enabling this option (with output to printer, only), the picture will be used as the background of text. This allows to print text or other pictures beside the image.

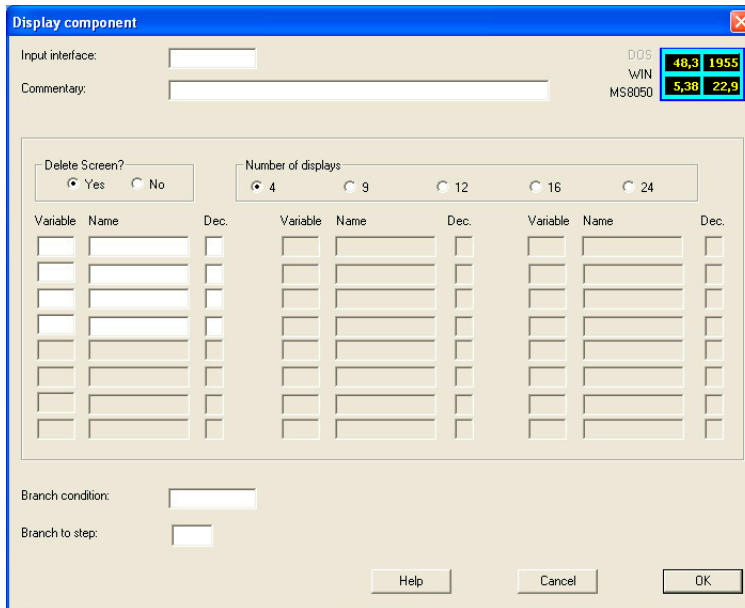
4.2.4 Display component



Important
This component is not available for the DOS version of **HYDROrun** (PASS).



Use the display component to show values on the screen. Dependant how many different values shall be displayed, size and distribution will be adjusted automatically.



Pic. 30 Display component

Delete screen

Select whether the screen shall be cleared before the component is executed.

Number of displays

Select how many display shall be shown on the screen. The larger the number, the smaller the display size.

Variable / Name / Dec.

Enter the variable that shall be displayed. You can use all measurands, counter variables (Z1 ... Z255), and the general value variables (W1 ... W255).

Possibilities for the display selection

By selecting a larger number of displays and using only some of them, you can control the positions where the variables shall be displayed. If twelve displays are selected and the displays 1, 4 and 8 are used, this distribution will be shown on the screen:

3,20			24,2
			108

4.2.5 Diagram component

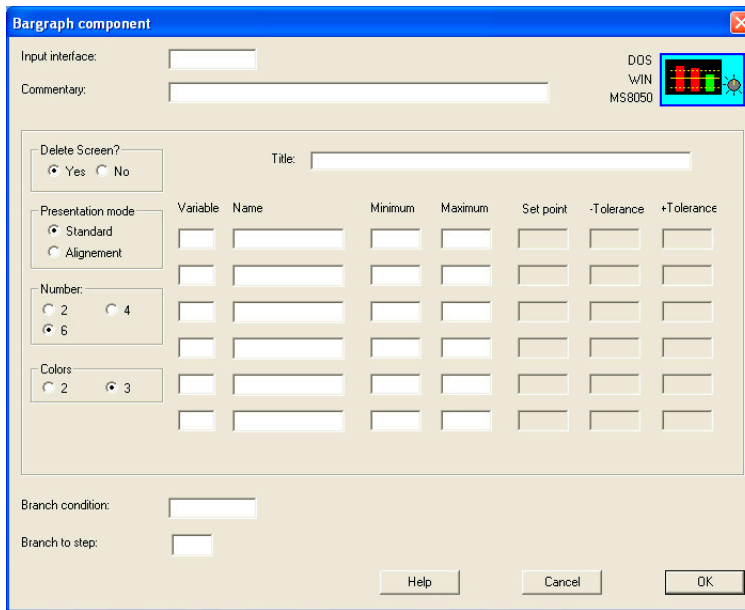


Important

This component can process the maximum of four bargraphs with the DOS version of **HYDROrun (PASS)**.



Use this component to present measurands or calculated values as bargraphs. It is useful to integrate this component into a cycle to update the bargraphs continuously. Beside the bargraphs, the values will be shown in numbers.



Pic. 31 Diagram component

Delete screen

Select whether the screen shall be cleared before the component is executed. During the cyclic update of measured values, the screen should not be deleted to avoid a blinking of the screen.

Presentation mode

You can choose from two presentation modes:

- Standard here you define limits, between those the bargraphs shall be displayed (min/max values); if the value is within the limits, the bargraph will be displayed in the corresponding size with green color; if the value is outside the limits, the bargraph will be displayed in red; the numerical display always shows the current value
- Alignment here you enter a must value and upper/lower threshold values; if the measured value is inside these limits, the bargraph is indicated in green color, otherwise in red

Number

Select how many bargraphs shall be indicated. The selected number determines the size of the bargraphs. This allows you to realize effects by choosing the right settings.

Colors

In the two-color mode, only the colors green and red are used in the alignment presentation mode. In the three-color mode, the bargraph is colored light-blue when the current value is between low threshold and must value.

Headline

Enter the text that shall be displayed as headline of the diagram.

Variable

Enter the variable that shall be displayed as bargraph. You can use all measurands, counter variables (Z1 ... Z255), and the general value variables (W1 ... W255).

Name

Enter a text that shall be displayed as the name of the bargraph.

Minimum / Maximum

Enter the desired values for the standard presentation mode (see above).

Must value / – Tolerance / + Tolerance

Enter the desired values for the alignment presentation mode (see above).

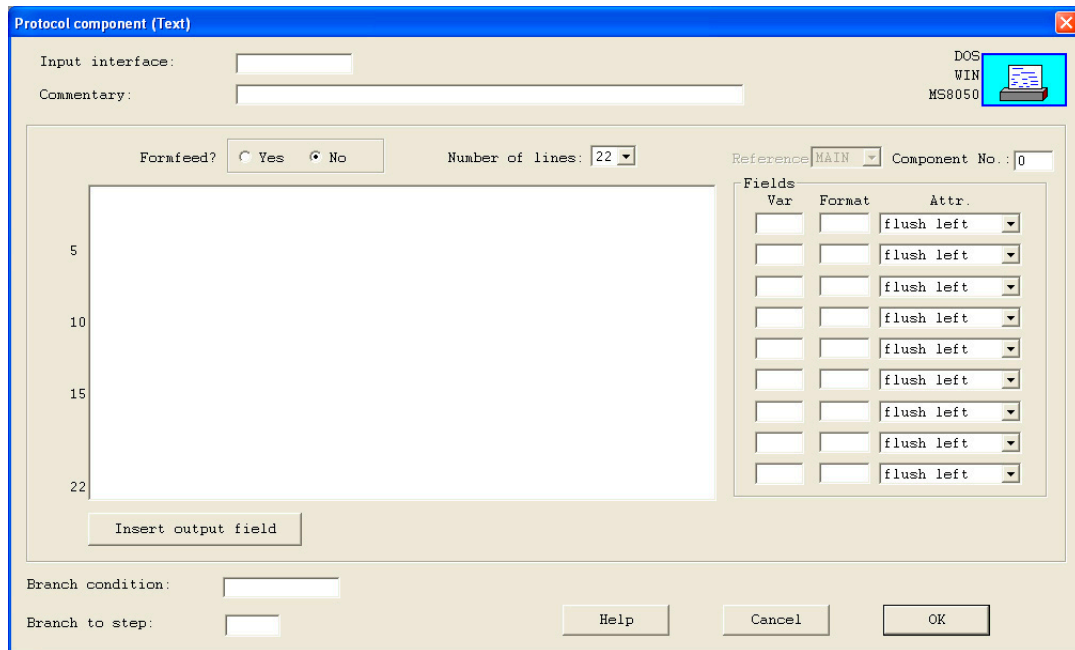
4.2.6 Text protocol component



Similar to the programming of the input/output component (see section 4.2.1 on page 22), a mask is created here, where output fields can be integrated. While the input/output component will always output the current value of a variable or measurand, this can be different with the text protocol component.

If you reference a component where values are saved, all measured or calculated values will be issued as a table. The first value will be issued at the defined position, the others below that. Although the maximum of 22 lines can be defined in a text protocol, the printing may need several pages dependant on the number of values to be printed.

Possibly a protocol component can comprise only a part of a protocol (max. 22 lines can be defined). In this case you may define several protocol components and disable the page feed at the subsequent components. Then the different parts will be printed without interruption.



Pic. 32 Text protocol component

Page feed

Select whether a page feed shall be done after the text protocol has been printed.

Number of lines

Select the number of lines for the text protocol. If you select 22 lines and use the first five lines, only, 17 empty lines will be issued below the last printed line.

Reference component

If you use output fields, the current values of their variables will be printed. If you want to print values that have been printed at a certain position of the test sequence, you can enter the number of the corresponding component. Additionally you will have to select, whether this component is part of the test sequence (MAIN) or of an component interrupt routine.

Mask area

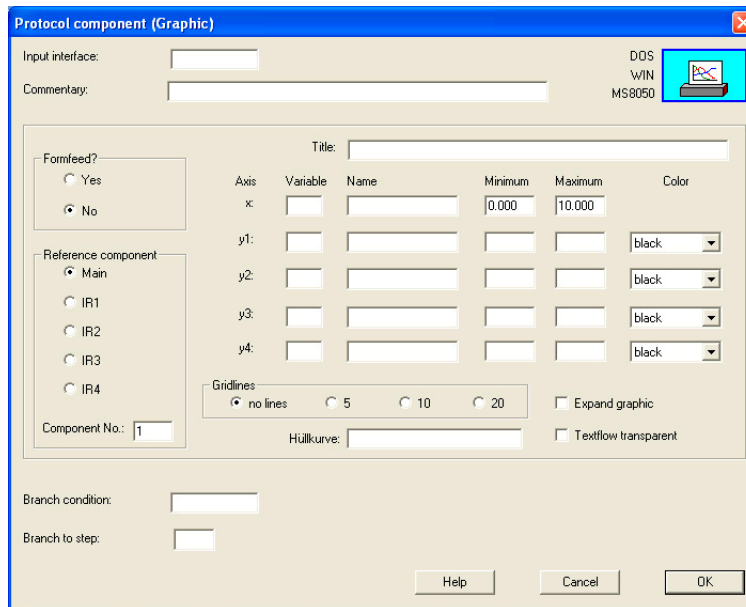
Please see the explanations in section 4.2.1.1 on page 23.

Enter the desired text and define the output fields. Do not forget to define all used fields in the list left of the mask area.

4.2.7 Graphic protocol component



The definition of this component is done in a similar way like the graphic component (see section 4.2.2 on page 26). Additionally you have the possibility to modify the resolution of the y-axis.



Pic. 33 Graphic protocol component

Page feed

Select whether a page feed shall be done after the graphic protocol has been printed.

Reference component

If you use output fields, the current values of their variables will be printed. If you want to print values that have been printed at a certain position of the test sequence, you can enter the number of the corresponding component. Additionally you will have to select, whether this component is part of the test sequence (MAIN) or of an component interrupt routine.

Headline

Enter a text that will be used as the headline of the graphic.

Variable / Name / Minimum / Maximum / Color / Grid lines / Envelope

Please see the explanations in section 4.2.2 on page 26.

Expand graphic

The software **HYDROrun** for Windows uses 25 % of a DIN A4 page for the graphic output. By expanding the graphic, the output will be enlarged to 50 % what increases the resolution of the y axis.

The software **PASS** for DOS uses an area of 21 lines for the output, what correlates with a resolution in y direction of 160 points. By expanding the graphic, 36 lines will be used and the y axis resolution is increased to 320 points.

Text flow transparent

Use this option to suppress the page feed for the size of the graphic. Then you can print additional outputs beside the graphic, or print two graphics as an overlay (two measurements in one graphic).

4.2.8 Online graphic component

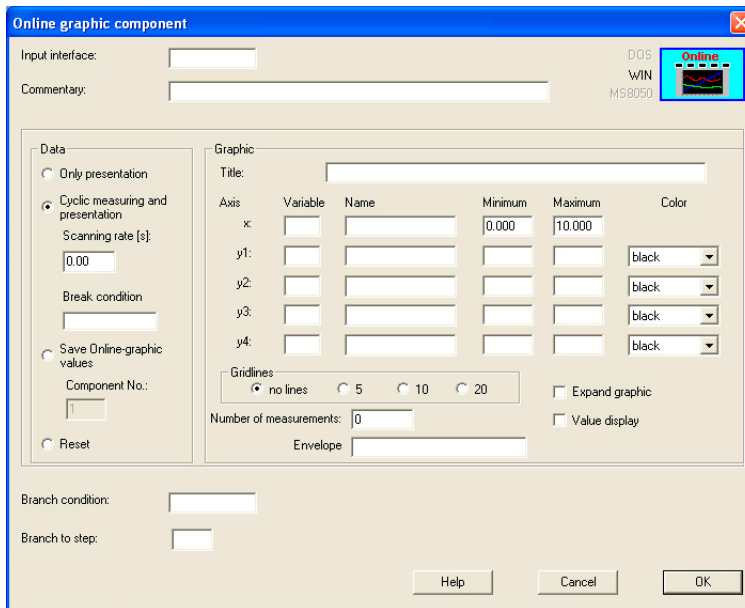


Important

This component is not available for the DOS version of **HYDRORun (PASS)**.



Use the online graphic component to display values graphically (line diagram). You are free to assign variables to the coordinate axes, the maximum of four variables can be overlaid on the y-axis. Additionally you can display one or several reference curves (envelopes) within the graphic.



Pic. 34 Online graphic component

Data

You can choose from four options:

- Presentation only the desired values will be written into a temporary data buffer and presented graphically; then this step is finished
- Cyclic measuring ... this option is available for measuring data, only; if selected, scan rate (time interval between two measurements) and break condition must be defined
- Speichern online ... the values will be stored in a temporary file and can be used by other components (graphic, graphic protocol, command)
- Reset all parameters and the data area of the last online graphic component will be resetted or deleted; then a new online graphic presentation will be possible

Headline / Variable / Name / Minimum / Maximum / Color / Grid lines / Envelope

Please see the explanations in section 4.2.2 on page 26.

Number of measurements

This defines the size of the data area; this is independant from the defined scaling of the axes.

Expand graphic

This influences the size of the online graphic. Without expansion it will cover about three quarters of the available space to leave room for additional information that can be created with an input/output component. If you do not need this, you may expand the graphic to cover the whole available space.

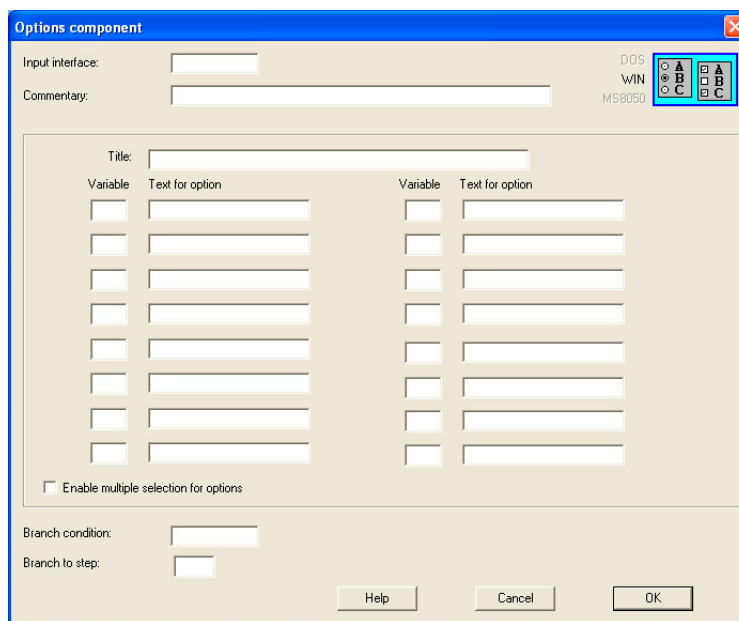
Value display

If enabled, the current values will be displayed numerically above the online graphic.

4.2.9 Options component



Use the options component to create a selection list (options), with which the user can jump to certain positions of a test sequence. This allows to integrate differing test sequences for variants of a product into a single test sequence file. Additionally you can handle entries requiring “yes” or “no” in an elegant way.



Pic. 35 Options component

Headline

Enter the text that shall be displayed above the option list.

Variable

Enter the logic variable that shall be set if the corresponding options has been selected.

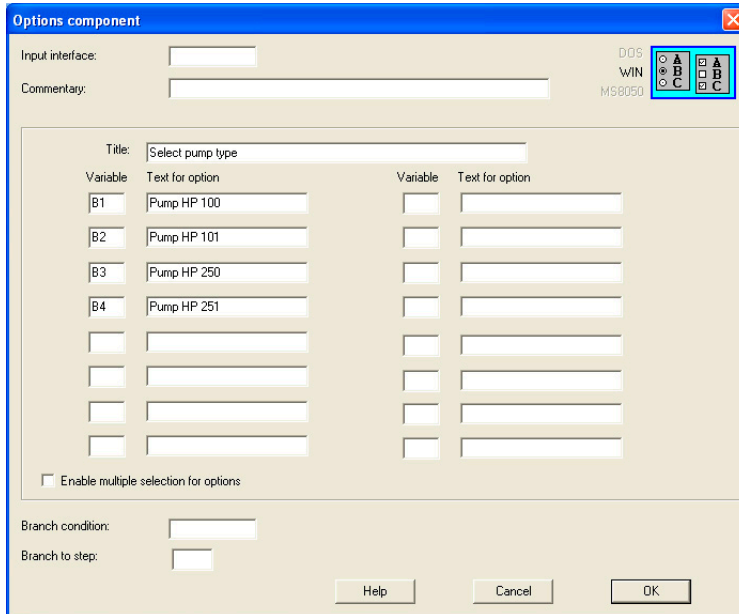
Text for option

Enter the text that shall be displayed as the description of the option.

Enable multiple selection

If this option is enabled, the user may enable several options. Otherwise the selection of a single option is allowed, only.

Example



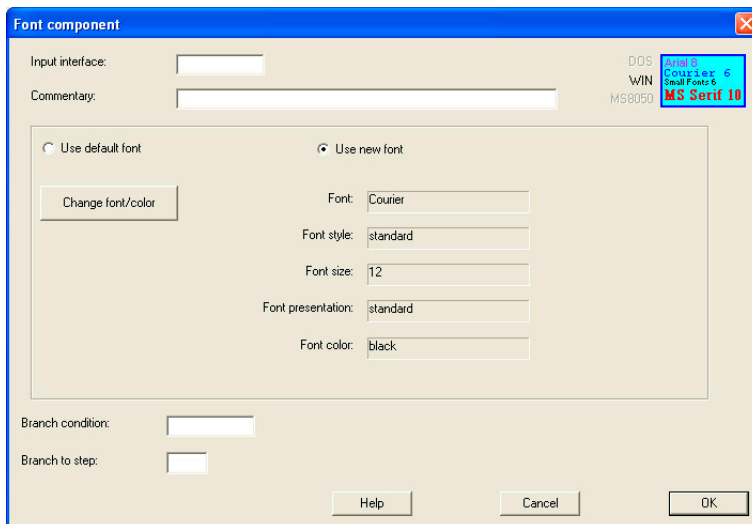
Pic. 36 Example of an options component

Here the user may select one of four pump types. Dependant on which type has been selected, one of the logic variables B1 ... B4 will be set. In the test sequence, you can define these variables as input condition for certain components.

4.2.10 Font component



You can use this component to setup the fonts used for printouts.



Pic. 37 Font component

Use default font

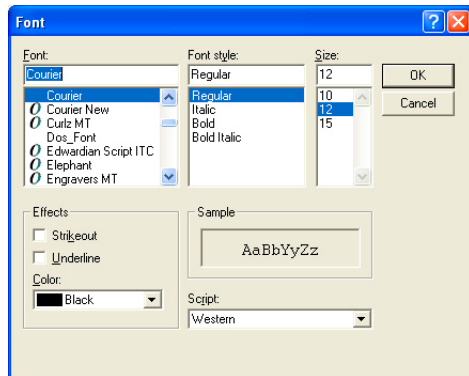
The HYDROrun default settings are used for printouts (font, color, font size).

Use new font

If this option is enabled, you can click on the button “Change font/color” to make individual font settings.

Change font/color

Click on this button to open the following dialog:



Pic. 38 Font selection dialog

You can select the desired font, font size and color here. This will be used for all printouts started after the font component.

4.3 Measure and control

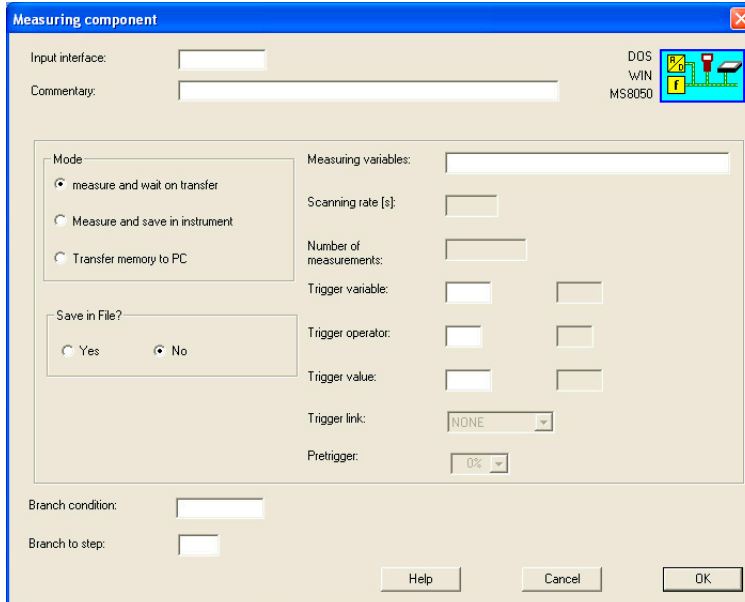
Here you can use five components:

- Measure component
- Control component
- Interbus-S component
- Logic component
- Sensor component

4.3.1 Measure component



This component is used for the communication with your Hydrotechnik measuring system.



Pic. 39 Measure component

4.3.1.1 Mode

You can choose from three modes:

Measure and wait for transfer (mode 1)

This requests one or several measurands to be transferred from the measuring instrument to the measure component either immediately, or after a trigger condition has been fulfilled.

In this mode you may enable the option „Save in file“. This should be done if the component is executed cyclic and all values shall be available for a later protocol or statistic calculations. Otherwise the internal measurand would contain the last measured value, only.

Measure and save in instrument (mode 2)

This brings the measuring system to record and save a series of measurements. Beside the measurands you will have to define scan rate and the desired number of measurements. The execution of the component is completed immediately after the measure and save command has been sent. The test sequence can be continued with other components, the recording and saving of measurements is completely independant.

Time-dependant measurements are possible applications, for instance the measurement of the signal $x(t)$ as response of a jump or ramp function at a control valve.

Transfer saved measurements (mode 3)

Use this mode to transfer measurement data to the component that had been collected by the mode „Measure and save in instrument“. There can be any number of other components between both components, if the series of measurements had not been completed, yet, the test sequence will wait with the transfer.

You can enable one of two options in this mode:

Stop memory and transfer	if the requested series of measurement is not completed when the component is started, the measurement will be stopped and the available measured values will be transferred
--------------------------	--

Wait for completion and transfer if the requested series of measurement is not completed when the component is started, the test sequence will be interrupted until the measurement is completed and the measured values can be transferred

4.3.1.2 Measurands

Measurands (modes 1 and 2)

Enter the measurands that shall be collected from the measuring instrument. You can use all physical measurands supported by your Hydrotechnik instrument, but no calculated channels. Enter the measurands consecutively without spaces (e.g. p1p2QT).

Scan rate (mode 2)

Enter a time interval in seconds that defines the gap between two measurements. You may enter values between 0.001 and 60 seconds.

Number of measurements (mode 2)

Enter the number of measurements that shall be saved in the instrument.

Trigger variable / Trigger operator / Trigger value (modes 1 and 2)

You may define any measurand as trigger variable. As an example you may define that measurements will start, after the pressure p3 has been fallen below 30 bar.

Enter the desired measurand into the box "Trigger variable" (e.g. p3). Enter the trigger operator (e.g. <) and the trigger value (e.g. 30). As trigger operators you may use ">" (bigger), "<" (smaller), "»" (ALT-175, pass through trigger value with rising edge) and "«" (ALT-174, pass through trigger value with trailing edge).

Trigger link (mode 2)

Here you may link a second trigger with the first. Select one of the logic compositions and then enter variable, operator and value of the second trigger. You may use these compositions:

NONE	no trigger link
AND	both triggers must be fulfilled before the measurement starts
OR	one of both triggers must be fulfilled before the measurement starts
START/STOP	the first trigger starts the measurement, the second trigger stops it

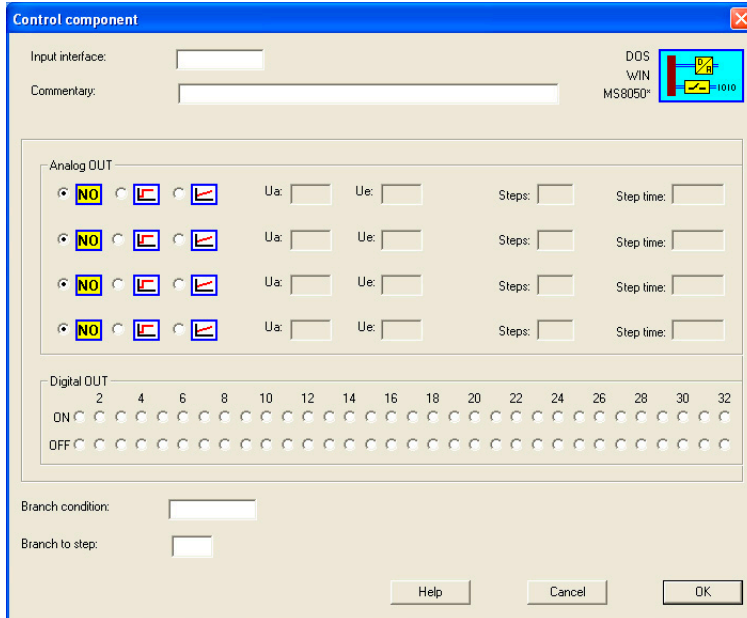
Pretrigger (mode 2)

Here you may define a percentage of the measurements that shall be used for the recording of measured values that have been measured just before the trigger has been fulfilled. As an example you have set 100 measurements and a pretrigger of 10%. If the trigger happens, the last ten measurements before and 90 measurements after the trigger incident will be stored.

4.3.2 Control component






By using the control component you can actively control a process (e.g. test stand) by emitting analog and digital signals. The component supports the maximum of four analog and 32 digital outputs, but the computer must be equipped with a corresponding multifunctional I/O-card, or the measuring instrument must be equipped with digital or analog outputs.



Pic. 40 Control component

4.3.2.1 Analog outputs

The control component can control the maximum of four analog outputs simultaneously. You can choose from three options for each analog output:

-  analog output is not used
-  jump function: the analog output will be set to the defined voltage immediately; the voltage Ue must be entered
-  ramp function: the output signal will be brought in steps (stairway) from a start to an end voltage; Ua, Ue, steps and step time must be defined

You have to define at least one of the following values for each analog output you want to use:

- Ua** start voltage; start of the ramp function that does not have to start at zero; additionally a negative ramp (start voltage > end voltage) is possible; you can enter each voltage value between 0 ... 10 V; you can also use a W-variable; but please assure that the variable will have a valid value
- Ue** end voltage: end of the ramp function, or output voltage at the jump function; you may enter each voltage value between 0 ... 10 V; the values Ua and Ue may not have identical values; you can also use a W-variable; but please assure that the variable will have a valid value
- Steps** number of steps to bring the analog output from the start to the end voltage; the maximum of 4095 steps is possible; for a card with an analog output of 0/10 V this would correspond with 2.4 mV per step; this would be the best possible approach to a ramp; practically a much smaller number of steps is sufficient; it is inexpedient to bridge a small voltage difference with many steps that one step is less than 1 digit; you can also use a Z-variable; but assure that the variable brings valid values
- Step time** time (in ms) between two steps; enter a value between 10 and 30,000 ms (0,01 ... 30 sec.); time and number of steps describe the steepness of the ramp; you can also use a Z-variable; but assure that the variable brings valid values

4.3.2.2 Digital outputs

You can control max. 32 digital outputs. The outputs that are not set to ON or OFF will not be changed.

4.3.3 Interbus-S component



Important

This component is supported by the Windows version of **HYDROrun**, only. The use of Interbus-S modules in the Hydrotechnik measuring instruments is not possible.

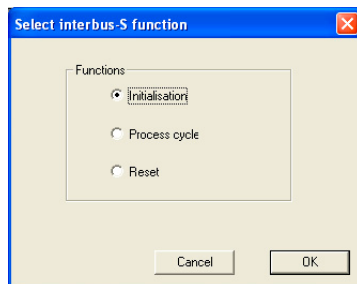


This component will be used, if Interbus-S modules shall be used for the collection of measuring data and control purposes. The following assemblies of the company Phoenix Contact are supported:

- digital outputs, 8 channels, 16 channels
- digital inputs, 8 channels, 16 channels
- analog inputs, 4 channels, 4 ... 20 mA, 0 ... 20 mA
- analog outputs, 4 channels, 0 ... 10 V

The component supports the maximum of four analog outputs, 24 analog inputs, 96 digital outputs and 96 digital inputs, the use replaces the control component.

4.3.3.1 Function selection



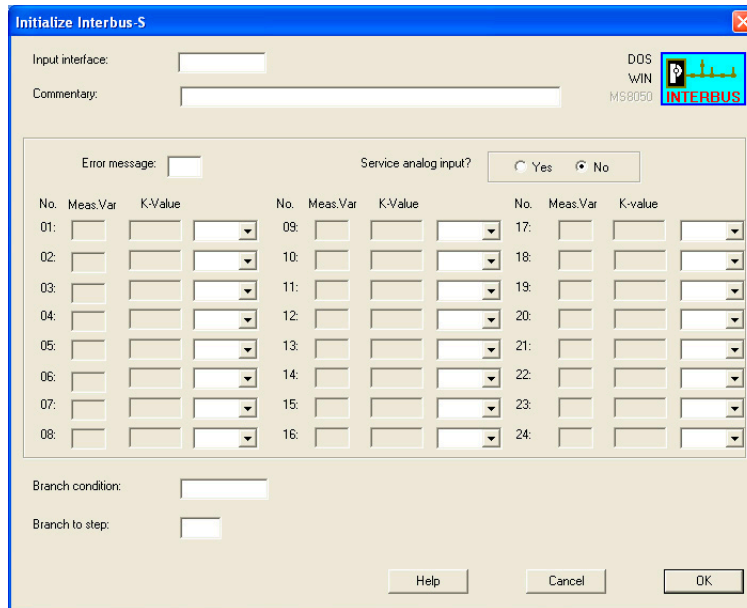
Pic. 41 Interbus-S component – function selection

The Interbus-S component combines elements of the measuring component, the control component and the subfunction „Scan digital inputs” of the logic component. It comprises three subfunctions that will all have to be integrated into the test sequence, if Interbus-S modules shall be used.

After selecting the component, you will have to decide in the shown dialog, which function shall be used at this position of the test sequence. Highlight the desired option and then click on [OK].

4.3.3.2 *Initialisation*

Before Interbus-S modules can be contacted, the Interbus-S system must be initialised.



Pic. 42 Interbus-S component – initialisation

Error message

Enter a logic variable (B1 ... B255) in this box. After each access to the Interbus-S, this variable will either be set to "1" (Interbus-S error) or "0" (no error). This logic variable can be evaluated within the test sequence.

Control analog inputs

Here you can choose, whether you want to control the analog inputs of the Interbus-S („Yes“). This component supports maximal 24 analog inputs. Each used analog channel must be defined, since they are interpreted as measured values.

Measurand

Enter the measuring variable, where the measured values shall be written to. You may use the same variables like with the measuring component (see section 4.3.1 on page 39).

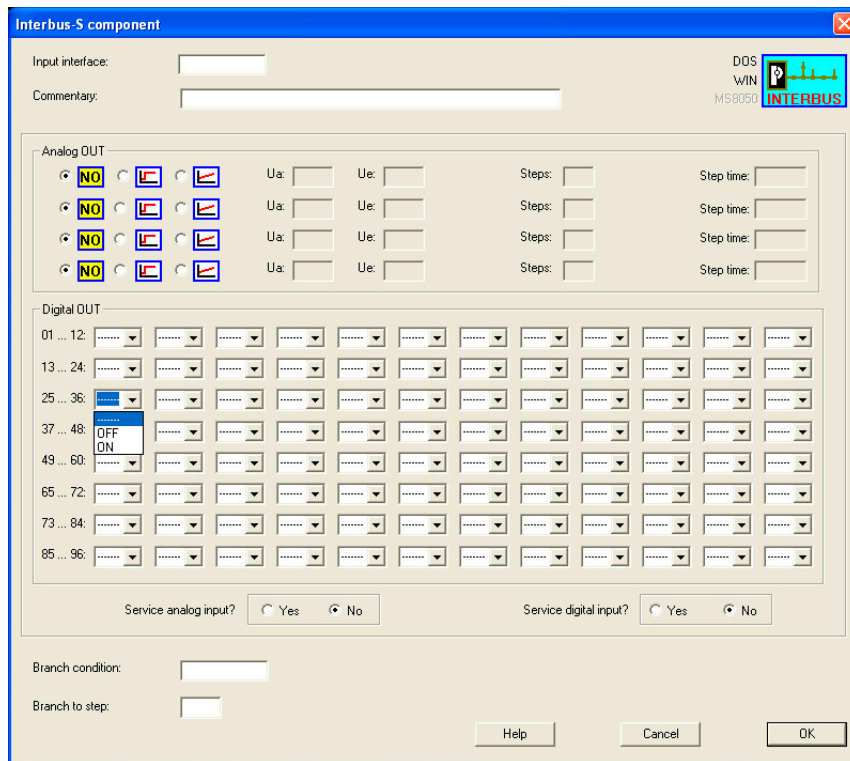
K value

You are free to connect any sensors with an output signal of 0 ... 20 mA or 4 ... 20 mA to the analog inputs of the Interbus-S. With the K value (calibration value) you define, which physical measured value corresponds with the sensor signal 20 mA. We assume that the physical measuring range always starts at zero. If this is not the case, you will have to use an arithmetic component to correct the measured values correspondingly.

Examples of sensors	Measurand	K value	
Pressure sensor, 0 ... 600 bar	p1	600	0-20 mA
Temperature sensor, -50 ... 200 °C	T1	250	0-20 mA
Correction (measured value W1 in arithmetic component)	W1=T1-50		
Pressure sensor, 0 ... 400 bar	p2	400	4-20 mA

4.3.3.3 Process cycle

This component is used to hand-over values to the Interbus-S, or to read values from the connected Interbus-S modules.



Pic. 43 Interbus-S component – Process cycle

Analog outputs

Please see the hints for the operation of the analog outputs in section 4.3.2.1 on page 41.

Digital outputs

The Interbus-S component supports maximal 96 digital outputs. Set the desired outputs to „ON“ or „OFF“. Outputs where „---“ is displayed will not be changed by this component.

Control analog inputs?

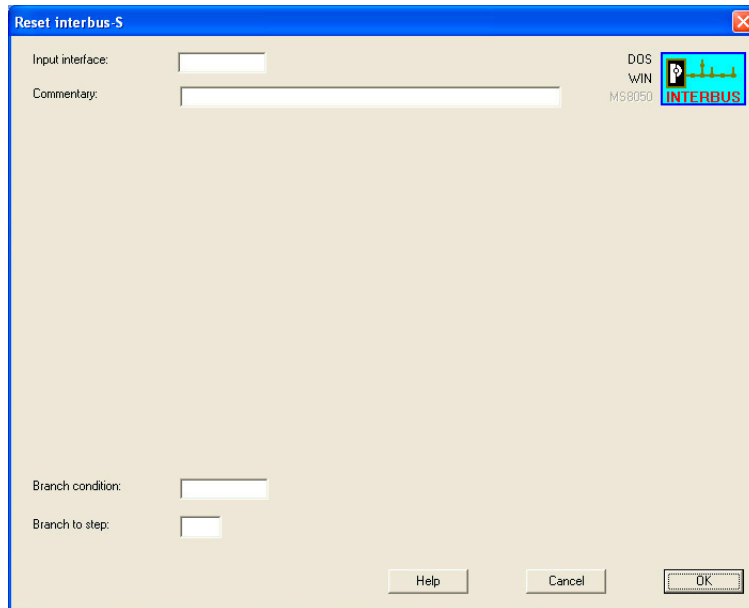
If you enable „Yes“, the values of the analog inputs will be taken from the Interbus-S and the corresponding variables will be set (see section Fehler! Verweisquelle konnte nicht gefunden werden. on page Fehler! Textmarke nicht definiert.).

Control digital inputs?

If you enable „Yes“, the conditions of the digital input modules of the Interbus-S will be taken over and the corresponding variables (E1 ... E96) will be set.

4.3.3.4 Reset

All outputs and the logic of the modules of the Interbus-S system are reset with this component.

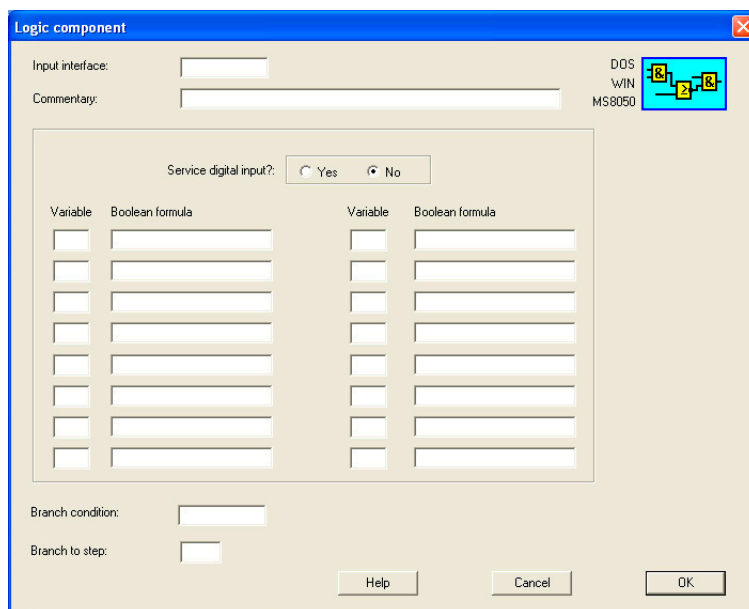


Pic. 44 Interbus-S component – reset

4.3.4 Logic component



You can realise conjunctions in correspondance to the logic algebra using this component. Additionally you can interrogate the digital inputs of a multifunctional I/O-card or of a Hydrotechnik measuring instrument and include the signals into the conjunctions.



Pic. 45 Logic component

Interrogate digital inputs?

If you enable „Yes“, the digital inputs will be interrogated and the internal variables (E1 ... E32) will be set correspondingly, before the component is processed.

Variable

Enter the logic variable (B1 ... B255) where the result of the conjunction shall be assigned to.

Logic formula

Enter the desired logic formula into this box. The formula can comprise one or several comparisons that may be linked logically. Any variables can be compared with themselves or with constants.

The most simple comparison is the entry of a logic variable or an input. In this case it will only be checked for TRUE or FALSE, the second comparison value is dropped. You may use the conjunctions (AND) or disjunctions (OR) for the linking of more than one comparison.

The table contains all possible comparisons and linkages together with examples:

Comparison	may be used with:									example
		value variable	counter variable	measurand	constant	text	logic variable	digital inputs	comparisons	
<	smaller	X	X	X	X					T1<100
>	larger	X	X	X	X					W1>1.31
<=	equal or less	X	X	X	X					Q1<=120
>=	larger or equal	X	X	X	X					N1>=N2
=	equal	X	X	X	X	X				S3=99-23-123
!=	not equal	X	X	X	X	X				S1!="no"
<leer>	interrogation						X	X		B8
!	negative interrogation						X	X		!E2
&	conjunction (AND)						X	X	X	S1=yes&T1<=25
	disjunction (OR)*						X	X	X	B1 B2 B3
()	bracketing	X	X	X	X	X	X	X	X	B1&(E1 E2)

* The character | can be entered using the key combination ALT-124.

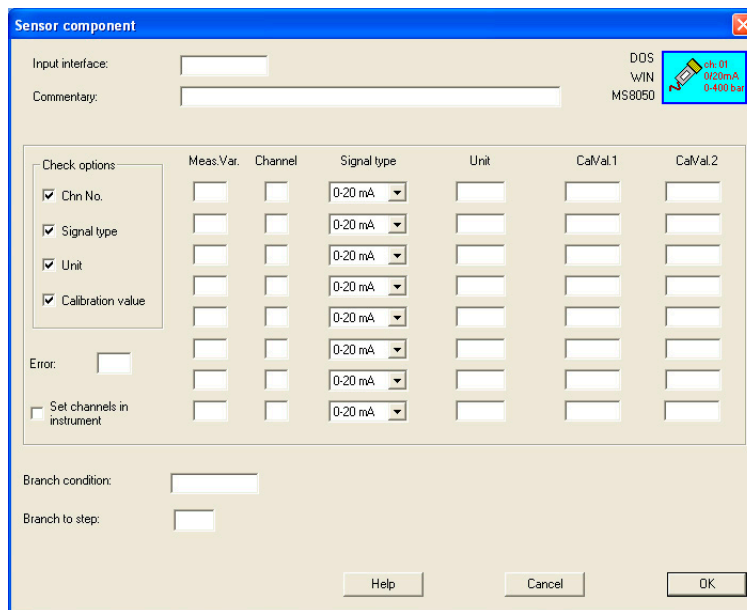
4.3.5 Sensor component



Important
This component is not supported by the DOS version of **HYDROrun** (PASS).



Mit diesem Component können Sie verschiedene Kanaleinstellungen im angeschlossenen Hydrotechnik Mess-System überprüfen und auf Wunsch verändern. Dabei werden die dort gespeicherten Einstellungen mit den Einstellungen verglichen, die Sie in diesen Component eingeben.



Pic. 46 Sensor component

Check options

Enable all parameters where the settings in the measuring instrument shall be checked or set.

Error

Here you may define a logic variable. This will be set if an error occurred during the checking of the parameters.

Set channels in instrument

Enable this option to overwrite the channels settings in the measuring instrument by the settings defined in this component, if deviations are detected during the parameter check. If this option is disabled, all settings remain unchanged. The logic variable "Error" will be set in any way, if deviations are detected.

Measurand

Enter the name of the measurand here.

Channel

Enter the number of the channel (only if this parameter is enabled in the check options).

Signal type

Select the sensor type from the drop-down list (only if this parameter is enabled in the check options).

Unit

Enter the units of the measurand (only if this parameter is enabled in the check options).

Calibration value 1/2

Enter the calibration values (correspond with the measuring range) of the sensor here (only if this parameter is enabled in the check options).

4.4 Calculations

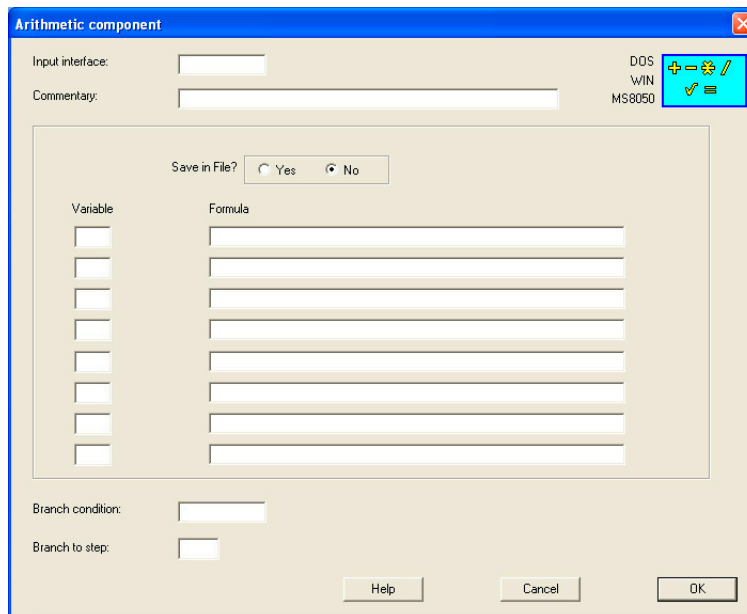
Here you may use two components:

- Arithmetics component
- Statistics component

4.4.1 Arithmetics component



Use this component to conjunct measurands and execute a large number of mathematical calculations. You may define up to eighth mathematical formulas and assign the results to internal variables.



Pic. 47 Arithmetics component

Save in file?

If „Yes“ is enabled, the calculated values will be saved in a file. In case of a cyclic processing you may then use all calculated values later (e.g. for a protocol). If saving is active, no text variables may be used.

Variable

Enter the variable where the result of the calculation shall be assigned to. You can use integer (counter) variables (Z1 ... Z 255) and the general value variables (W1 ... W255). If operators like logarithm or square root are used in the formula, the use of integer variables is not possible. In the case of other mathematical conjunctions you have to decide, whether the use of integer variables is sensible. Please consider the possible value ranges of the variables.

Additionally the component supports the assignment of tests or date/time to a text variable.

Formula

A formula comprises at least one variable or a numerical value (constant).

Normally formulas contain the conjunction of several variables and/or constants. With the exception of text variables (S1 ... S255), you can use all measurands and internal variables (W1 ... W255, Z1 ... Z255) in formulas. You may use the standard mathematical operators and one bracket level. For time evaluations you may also enter the variable TM instead of a formula. Then the current time in seconds with an accuracy of 1/100 sec. will be assigned.

The formula may comprise the maximum of 25 characters. If this is not sufficient, you must divide your formula into several parts and conjunct them to the total result.

Available mathematical operators

+	addition
-	subtraction
*	multiplication
/	division
lg(...)	logarithm (base 10)
ln(...)	natural logarithm (base e)
sqrt(...)	square root

For the operators „lg“, „ln“ and „sqrt“ you have to bracket the terms where the operator is related to, e.g. „lg(W1)“ or „sqrt(W2*Q)“.

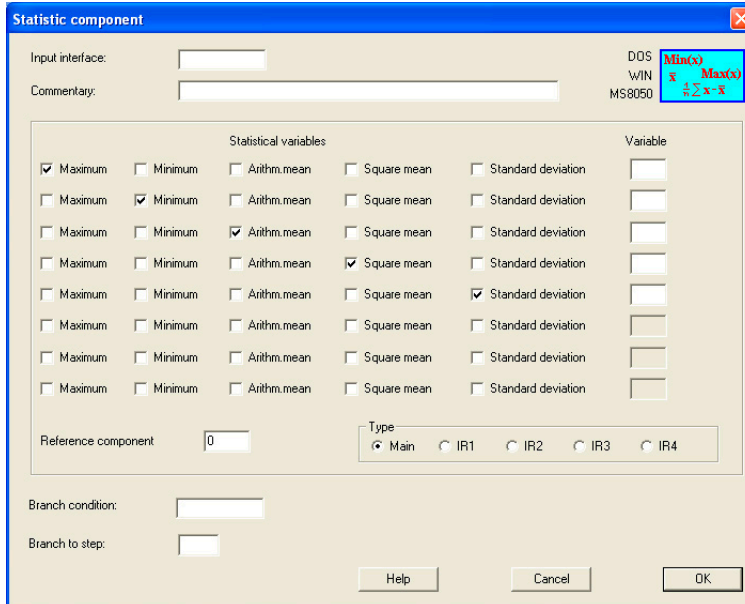
Examples

W1	T1-T2	
S12	"Temperature difference"	
W10	P1*Q1/600	
S23	DT	variable S23 then contains 14.03.2005
S24	DT(J)	variable S24 then contains 2005 (year only)
S25	DT(M)	variable S25 then contains 03 (month)
S26	DT(T)	variable S26 then contains 14 (day)
S1	TM	variable S1 then contains 14:23:32,12
S2	TM(5)	variable S2 then contains 14:23 (5 digits time information)
S22	S8+S12	addition of two texts

4.4.2 Statistics component



Use the statistics component to determine several statistical values.



Pic. 48 Statistics component

With the statistics component you may calculate several statistical values for up to eight variables. As a precondition, there must be more than one value for the used variable. Normally this is the case when you reference to a component with save option that has been processed more than once in the test sequence.

Statistical values

Select one of the available statistical values:

- Minimum determination of the minimum value of the variable
- Maximum determination of the maximum value of the variable
- arithm. mean calculation of the arithmetic mean value of the variable
- square mean calculation of the square mean value of the variable
- standard deviation calculation of the standard deviation of the variable

As soon as a statistical value has been selected, the entry box for the variable will be enabled.

Variable

Enter the name of the variable that shall be subject to the statistical calculation. You can use measurands, counter and value variables. The result of the calculation will be written into the statistical variables. The first maximum value will be written into variable MAX1, the second minimum value into variable MIN2.

Reference component

Enter the number of the component, where the values of the variables have been stored.

Type

Select whether this component is contained in the test sequence (MAIN) or an interrupt routine.

4.5 Data management

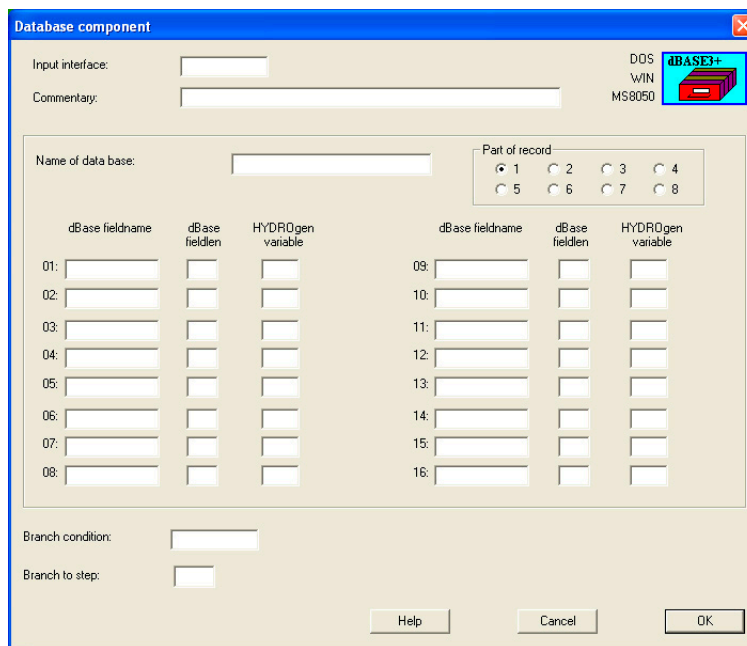
Three components are available here:

- Database component
- Database read component
- Database copy component

4.5.1 Database component



Use the database component to write test results into a database that is built up in the dBASE3-plus format. You can save variables, statistical values and measured values, the component supports maximal 16 fields.



Pic. 49 Database component

The values and variables from the test sequence will be saved in the database in the following ways:

variable	type	saved as
DT	date	date field, 8 digits
Z1 ... Z255	counter variable	numerical field without decimal places
W1 ... W255	value variable	numerical field with decimal places
S1 ... S255	text variable	alpha-numerical field
TM	time	character field
MIN MAX ...	statistical values	numerical field with decimal places
p1, p2, T1, ...	measured values	numerical field with decimal places
B1 ... B255	logic variables	logical field
E1 ... E96	digital inputs	logical field

You may string together the maximum of eight database components to create databases with up to 128 fields. Please consider that the length of one database record may not exceed the value 768 and that the maximum of twelve databases with more than 16 fields are supported.

Name of database

Enter a name for the database. Do not use special characters (e.g. colon, backslash) and mutated vowels. If you want to use the database later in other applications, there could be special demands to the name of the database. Please see the documentation of the application for further information.

You may also use a text or counter variable (S1 ... S255, Z1 ... Z255). The database then receives the content of this variable as file name. Please assure that the variable cannot get a content that contains incorrect digits.

Part of record

Always use part of record 1 when creating a database with not more than 16 fields.

For larger databases, several database components must be used. Enable part of record 1 at the first component, 2 at the second a.s.o. It is advantageous but not a must to arrange the record parts of a database file in the test sequence consecutively. But record part 1 **MUST** be processed before all other parts, the further sequence is free.

It is not possible to process a different database between the record parts of one database. **HYDROgen** supports any number of databases within a test sequence, only databases with more than 16 fields are limited to a total number of 12 files.

Be very careful when using databases with more than 16 fields. By the definition of input and/or branch conditions it may happen that a record part of a database will not be written. If the record parts are processed consecutively without input or branch conditions and if there is no jump from any position of the test sequence between the database components, you will not get any problems.

dBASE field name

The text entered here will be used as the field name for the contents of a variable. You may only use letters.

dBASE field length

This specifies length and format of the database field. Enter the positions before and behind the decimal point for all variables that will be issued with a decimal point. Please consider:

DT data fields must have eight characters
B1..B255
E1..E96 must be logical fields with one character

Please consider the hints in the section „Input/output component“ (see section 4.2.1 on page 22).

HYDROgen variable

Enter the variable that shall be saved in the dBASE field.



Important

The creation of the database shall only be done with **HYDROgen**. This avoids discrepancies between the head of the dBASE file and the record parts. **HYDROgen** checks whether there is a database with the entered name, already. If not, it will be created in accordance to the definitions. If a file exists, the field lengths of the first record part will be checked. If these do not match, an error message is issued. If you prefer to create the database with dBASE, you will have to assure that field names, types and lengths match between the dBASE file and the **HYDROgen** component.

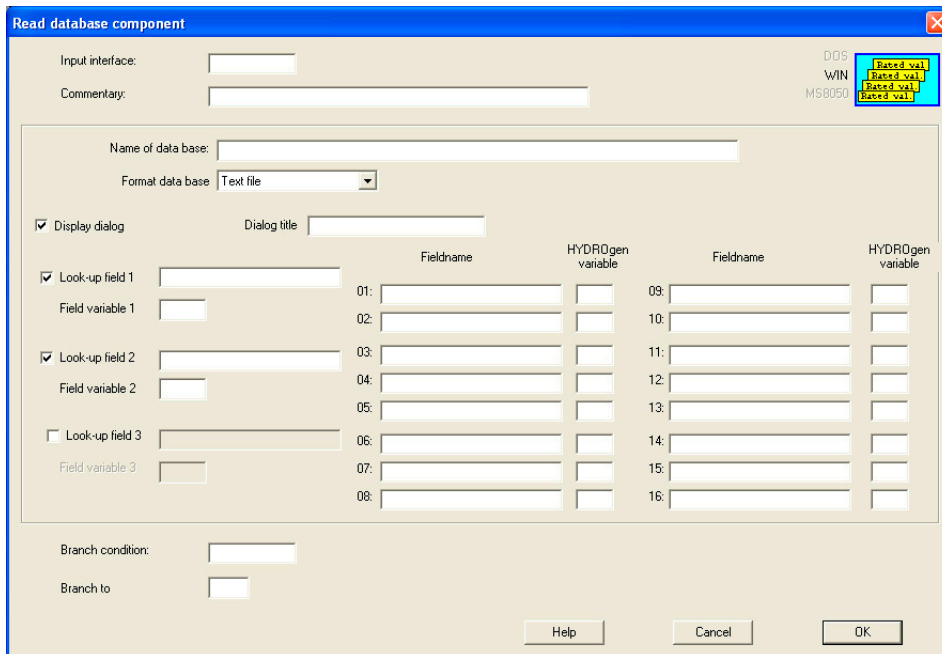
4.5.2 Database read component



Important
This component is not supported by the Hydrotechnik measuring instruments and the DOS version of **HYDROrun (PASS)**.



Component to read values from a database. If several types or variants of a product shall be tested, you can load the corresponding must values of the test parameters from a database.



Pic. 50 Database read component

Name of database

Enter the file name with the complete path (including all sub-directories), e.g. c:\data\examples\values.mdb.

Format database

Select the desired database format. Three different formats are supported by this component:

Text file (.txt):*

- Line 1 contains the fieldnames, separated by tabs
- Lines 2 to n contain the data, separated by tabs

Excel file (.xls):*

- Line 1 contains the field names
- Lines 2 to n contain the data

The sheet containing the desired data must have the same name like the Excel file.

Microsoft Access database (.mdb)*

The database containing the desired data must have the same name like the mdb file.

Display dialog

If this option is activated, a dialog will be displayed, where the operator may select the desired machine type from the database (example). Dependant on his choice, the corresponding must values for the test will be loaded.

This dialog will normally always be used when the read component is used. An exception is the combination of several read components, if more than 16 values are required, or if nested read components shall be used. Then the dialog will be used at the first read component and disabled at the others.

Example for nested databases

Three databases shall be used for this example:

database 1	machine data
database 2	pump data
database 3	cylinder data

In the first read component with reference to database 1, the machine is selected by type and serial number. As value you receive e.g. the types of pump and cylinder. With the pump type, a second read component with reference to database 2 is retrieved, the dialog is suppressed. Now the must values (pump performance, maximum pressure, ...) can be read from the database in correspondance to the pump in use. The same is done with a third read component, with which the cylinder data can be read in.

Dialog title

Test that shall be displayed as the title of the dialog.

Search field 1/2/3

You can search the database for the desired data using the search fields. You can use up to three fields that are linked logically AND,

Example

The search fields are defined as follows:

Search field 1	machine type
Search field 2	pump type
Search field 3	cylinder type

When the component is executed, the operator can select a machine type in search field 1. Then he can select a pump type in search field 2 and a cylinder type in search field 3. Then the data for a machine will be displayed that are assigned to the machine type with the selected pump and cylinder.

Search variable 1/2/3

Define a variable here, where the expression will be written to that has been defined as search field.

Field name

Enter the fields of the database containing the desired values.

HYDROgen variable

Define a variable for each used database field, where the value from the database shall be written to. You may use text (S), integer (Z), decimal (W) or logic (B) variables.

4.5.3 Database copy component



Important
This component is not supported by the Hydrotechnik measuring instruments and the DOS version of **HYDRORun (PASS)**.



Important
We recommend to use the database copy component as one of the first components in the test sequence, to avoid overwriting new measured values by old.

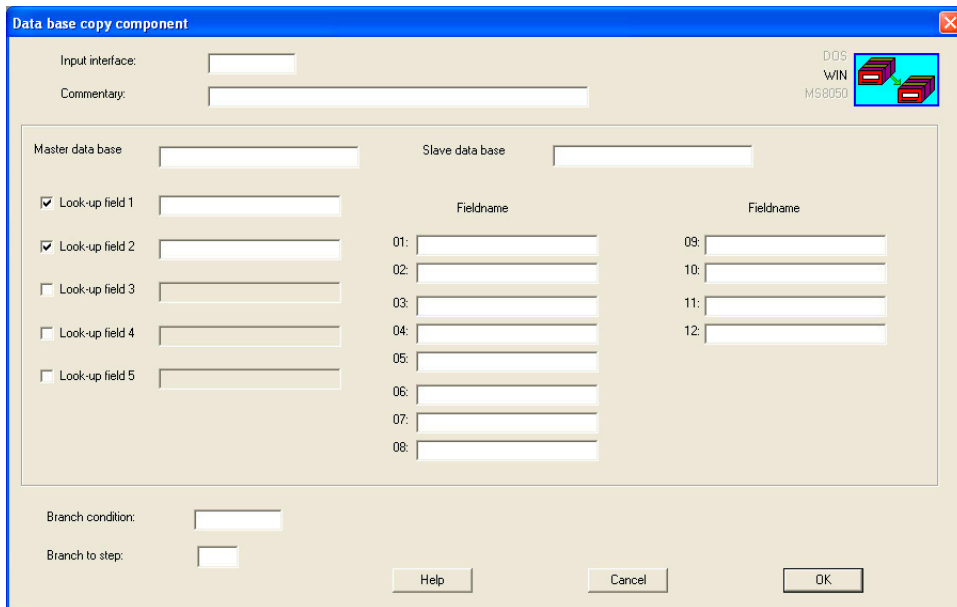


With this component you can copy values from one database into another. This allows the execution of partial tests on one or several measuring instruments or PCs and the combination of the test results in one PC.

Example

A vehicle is tested on a stationary test stand, the test results are saved in the database „Vehicle_test“. One test step is the drive test of the chassis. This partial test shall be executed with a MultiSystem 5060, the results are stored in the database “Vehicle_chassis”.

At the desired position in the main test sequence, the database copy component looks for the database “Vehicle_chassis” (slave). If this is found, the test results saved there will be copied into the database “Vehicle_test”. The assignment of the data from the slave database is done with maximal five search fields, where you may select e.g. for chassis version or serial number. This assignment must be unique. If several sets of data are found, the last found will be used. After copying the data from the slave database, this will be deleted automatically.



Pic. 51 Database copy component

Master database

Enter the name of the database, where the data from the slave database shall be written to. Enter the complete path, e.g. c:\data\vehicle\master.mdb.

Slave database

Enter the name of the database, from where the data shall be written into the master database. Enter the complete path, e.g. c:\data\vehicle\slave.mdb.

Search field 1/2/3/4/5

It is very important, to get the correct set of data from the slave database. You may define a selection with maximal five search fields that are all linked logically AND. The use of unique values in a set of data (e.g. serial number), eases this selection, since only one search field has to be used.

Field name

Enter the database fields where the values shall be written into the master database. Assure that the field names in the slave and the master database are absolutely identic, and are entered here correctly. Otherwise the copying will not work properly.

4.6 Control operations

Here you may use five components:

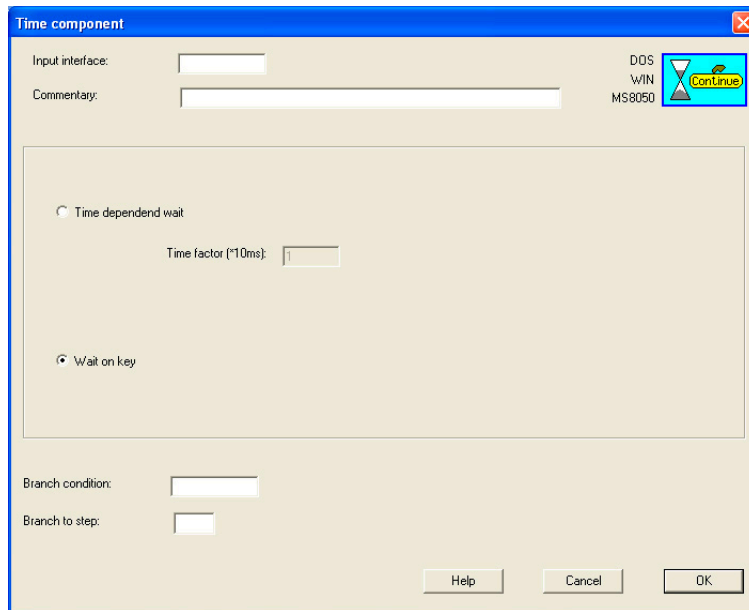
- Time component
- Interrupt component
- Break component
- Module component
- Test selection component

4.6.1 Time component



The components of a test sequence are processed consecutively without delay. You can control the time flow by defining either pauses of certain durations, or use the function "Wait for key". Then the test sequence will be paused until the operator has pressed a certain key.

Possible applications of the time component are the waiting for the deactivation of the transient effect after setting a valve, or the longer display of screen contents to give the user the opportunity to read and process the contents.



Pic. 52 Time component

Waiting time

Enable this option and enter a time factor into the input box. You may enter an integer value between 1 and 60,000, what results in a waiting time between 0.01 and 600 seconds.

Wait for key

The test sequence will be paused, until the key (F8 – CONTINUE) is pressed.

4.6.2 Interrupt component



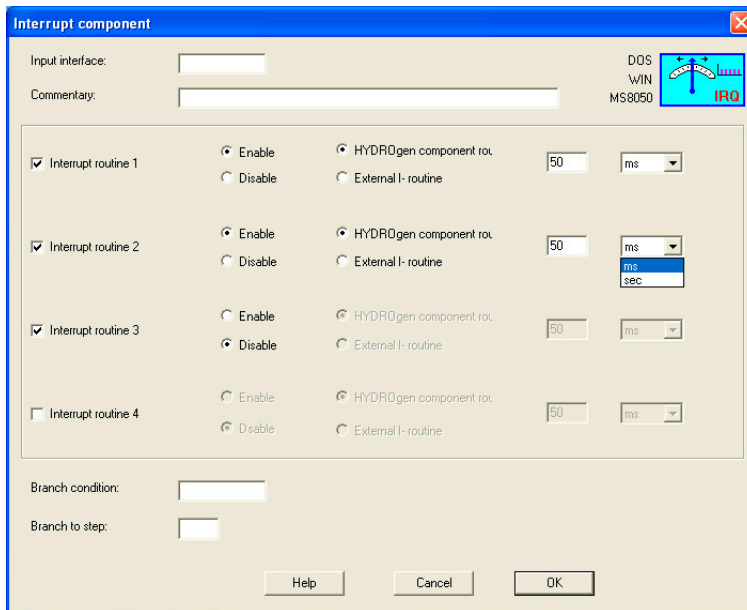
You may integrate up to four interrupt routines into the test sequence. They are used to execute certain functions (e.g. cyclic control of threshold values) in defined time intervals.

You could also integrate these functions into the „normal“ test sequence, but this would have disadvantages:

- the identic sets of components must be integrated at different positions into the test sequence
- the cyclic execution is not guaranteed, since there could be time delays at certain components (time component, input/output component, a.s.o.); no other components will be executed during these waiting times, so the cyclic processes will interrupted

Especially with critical applications, this task should be realised with interrupt routines.

HYDROgen can manage up to four interrupt routines. These can comprise components, or links to external routines. The routines are activated and disabled with the interrupt component.



Pic. 53 Interrupt component

Interrupt routine

Activate the interrupt routines that you want to control with this component. You may define for each routine:

- | | |
|--------------------|---|
| Enable/disable | activates or deactivates the interrupt routine |
| Component/external | select the type of the interrupt routine |
| Time delay | enter the time value and select the unit; the interrupt routine will be repeated after the defined time interval until it is disabled |

Information on interrupt routines

- Component interrupt routines should be as short as possible. It is not allowed to use the following components: measuring component with storage in the instrument, time component, graphic component, protocol component and input/output component with input fields.
- During the processing of a component in the main test sequence, no component interrupt routines are processed (exception: time component with "Wait for key" and graphic component).
- Component interrupt routines are test sequences with the same file name like the main test sequence (*.PAD), but with the file extensions *.IR1 (for interrupt routine 1) to *.IR4 (for interrupt routine 4).
- External routines are only available for PASS (the DOS version of **HYDROgen**) and are independant DOS programs.
- You may use „60“ „sec.“ (= one minute) as the maximum time interval. If you choose the time unit „ms“, you may enter maximal „5000“ (= five seconds). The minimal time interval is “1 ms” for external interrupt routines and “50 ms” for component interrupt routines. Please consider that these are minimal values that may not be fallen below. But they can be delayed considerably:
 - by the linking of several components to one component interrupt routine
 - by excessive operations within the interrupt routine
 - by the execution of several interrupt routines
- If you target minimal cycle times for one or several interrupt routines, you should consider the following:
 - the cycle time should be longer then the runtime of the interrupt routine
 - if several interrupt routines are used, it may happen even in the case of different cycle times that several or all interrupt routines are becoming active at the same time; as long as an interrupt routine is processed, a new interrupt will be ignored

4.6.3 Break component



Important
This component is supported by the PC version of **HYDROrun**, only. The use of break components in the Hydrotechnik measuring instruments is not possible. Break components may not be used in test sequence modules or interrupt routines.



Normally test sequences are executed from the start to the end. You may use the break component to stop test sequences at certain positions and continue them at a later time. All variables will be saved in a file that can be loaded later again. If the test sequence is executed until its end, this file will be deleted.

Applications for this component could be:

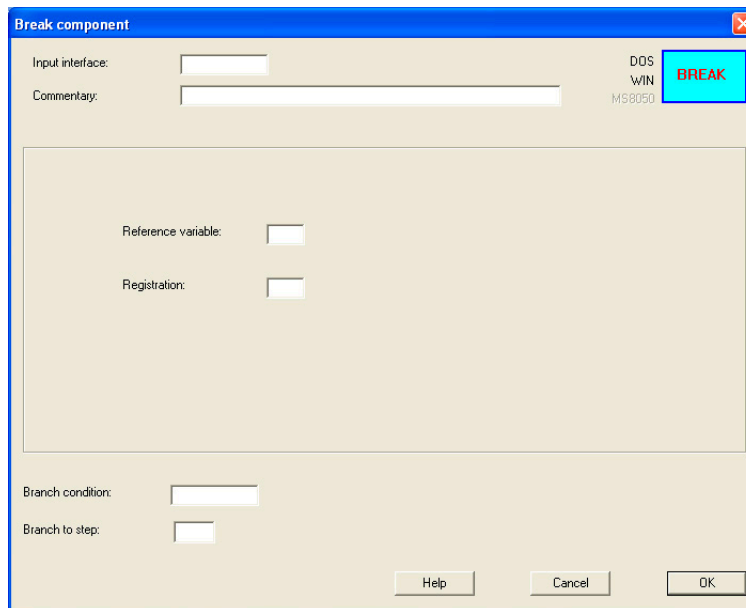
Skip components when repeating test sequences

If differences to the must values are detected during the execution of a test sequence (e.g. a checked valve is defective), the test will be ended and the product will possibly be repaired. If the repaired product is tested again, the test can be continued at the position of the break component without repeating the prior steps.

This method bears the risk that the repaired product would show different results for previously tested parameters that cannot be detected by skipping the first part of the test sequence.

Interruption of longer tests

If a test cannot be finished due to time reasons (e.g. end of work), it can be interrupted at a break component and be continued later.



Pic. 54 Break component

Reference variable

Enter the variable that shall be used as reference for the later access to the test.

It should be a variable that can be assigned to the test object uniquely. This avoids that the test will be continued with the test sequence of a different test object. Use e.g. an order, serial, or chassis number. These must either be entered in a text variable (S1 ... S255), or an integer variable (Z1 ... Z255).



Important

Please assure when using text variables that the first 20 characters will be used, only. The reference variable must be identical in all break components of the test sequence.

Registration

Here you can enter a logic variable (B1 ... B255). This will be set when an interrupted test sequence is continued.

Dependant on this variable you can arrange test steps after each break component which will only be executed, if an interrupted test sequence is continued. This allows you to set variables for time measurements or to note the interruption to the test protocol. A different logic variable may be used in each break component. This allows you to detect the position, where the interrupted test sequence has been continued.

Example for the registration of interrupted test sequences in the test protocol

In the first break component you use the logic variable B50, in the second B51 and in the third B52. After the test has been completed, the protocol may show:

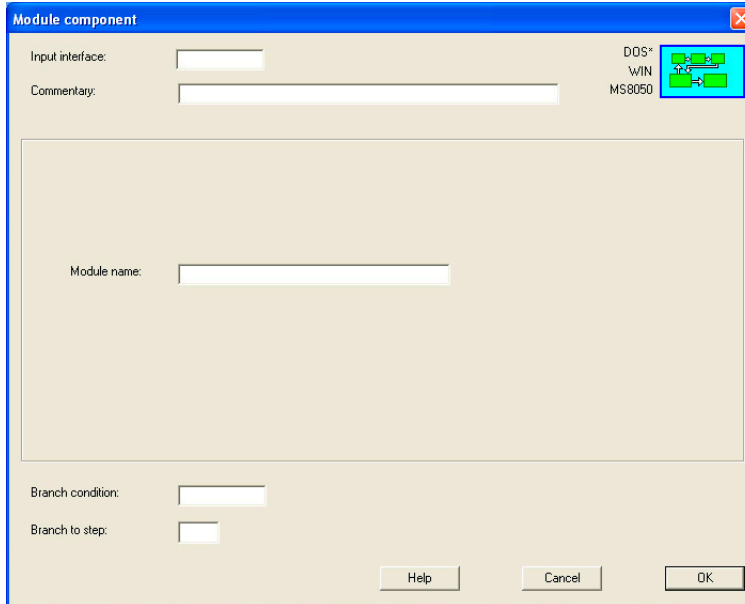
B50	B51	B52	Test
0	0	0	... has been processed without interruption
1	0	0	... has at least one interruption at break component 1
0	1	0	... has at least one interruption at break component 2
0	0	1	... has at least one interruption at break component 3
1	1	0	... has at least one interruption at break component 1 and 2
1	1	1	... has at least one interruption at break component 1, 2 and 3

If it is not interesting, at which position a test sequence has been interrupted, you should use the same registration in all break components. Then you will be able to see, whether the test has been interrupted, but not at which break component.

4.6.4 **Module component**



Large test sequences can be separated in modules. You may also group several components into modules and use them repeatedly and at different positions within the test sequence. The execution of a module is triggered with a module component, after the execution of the last component of a module, the main test sequence will be continued. Maximal 32 modules are supported within a test sequence.



Pic. 55 *Module component*

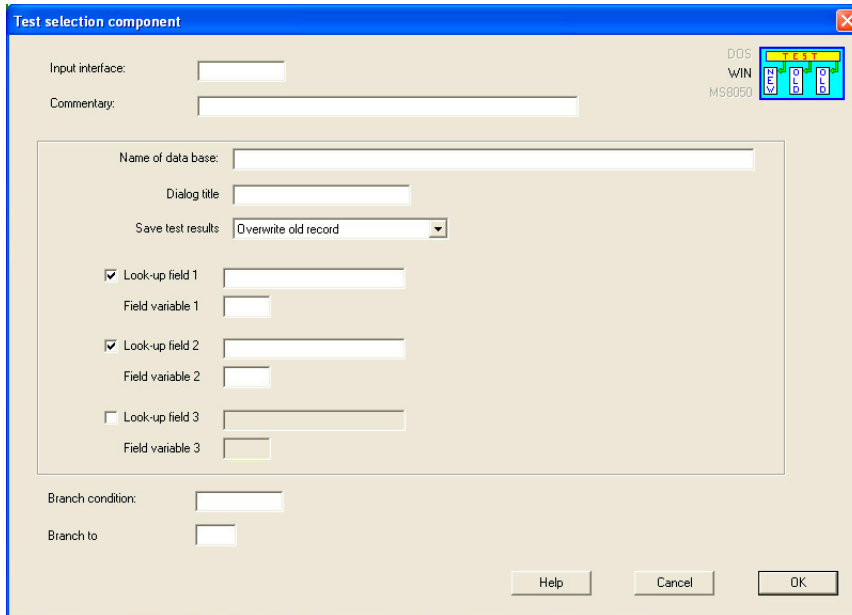
Module name

Enter the name of the module that shall be executed.

4.6.5 Test selection component



You may continue or repeat existing tests with this component. The tests can be selected from a database using search fields. Then all **HYDROgen** variables will be loaded and the test sequence can be continued or repeated at any position.



Pic. 56 Test selection component

Name of database

Enter the file name of the desired database together with the complete path.

Dialog title

The text entered here will be displayed in the title line when the component is processed.

Save test results

Here you may choose from three options:

- Overwrite old record the data of the repeated test will be replaced by the new test data; the old test data will be lost
- Append new record the data of the repeated test will be saved as a new record in the database; the old test data remain untouched
- Ask overwrite/append the operator will be asked in an additional dialog to decide between the two possibilities explained above

Search field 1/2/3

You can select the desired data record with maximal three search fields from the database. The fields are linked logically AND. The use of unique values in each data record (e.g. serial number) eases the assignment, since only one search field has to be defined.

Field variable 1/2/3

Define the variable where the expressions shall be written to that are defined as search fields.



Hint

You should position an options component in front of a test selection component to give the operator the opportunity, either to select a new or a repeated test. The test selection component should be executed in the later case, only.

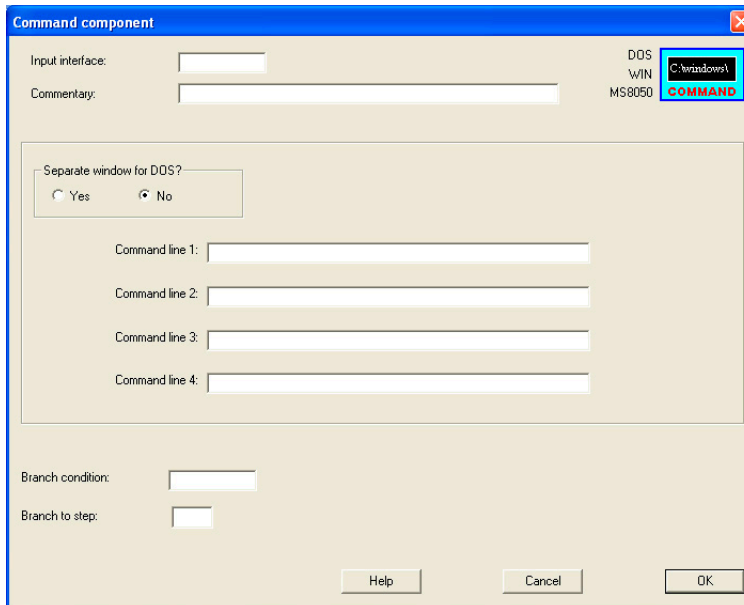
4.7 Special functions

4.7.1 Command component



This component offers a connection to the operating system DOS. You may define up to four DOS commands or program calls. The commands will be send to the operating system, processed and then the next component will be executed.

This allows you to integrate existing applications into the test sequence and execute additional tasks that cannot be realised using the **HYDROgen** components. But assure that the entered commands are correct, this will not be checked by **HYDROgen**.



Pic. 57 Command component

Enter maximal four commands into the lines that will be executed consecutively when the component is executed. Always enter the complete path if the external program is not in the current directory.

Separate window for DOS?

Since external programs or commands may also make outputs, a separate window should be opened for these outputs to avoid the **HYDROgen** outputs from being overwritten. If you are sure that no outputs will be generated, you may suppress the separate DOS window.

Important hint

You may not use all DOS commands with the program version **HYDROrun** for Windows. Normally this component is used to save temporary data.

During a test temporary data may be created by measuring and/or arithmetics component. Normally they will be deleted after the test has been completed. By using the command "SAVE" you can save these data. This will create a mwf file for the later processing of these data with **HYDROcom**.

If you want to do this, you should enter the following command (example):

```
SAVE <-par1> <-par2>
```

<par1> component number
-m23: measured data from component 23
<par2> name of the measured data file
-S14: file name of the measured data

5 Programming step-by-step

In this chapter we describe the programming of examples that have been taken from the practice. You will learn step-by-step, how a test sequence is built up and why components are used at certain positions.

5.1 Adjustment instruction for valves

5.1.1 Conception of the test sequence

Verbal description

A valve shall be adjusted in a way that it shows an exactly defined volume flow at a certain test pressure. Certain tolerances shall be allowed for test pressure and volume flow rate, the valve test shall be done using a graphical presentation. The name of the test operator, the serial number of the valve and the test results shall be saved. The operator shall be able to display additional information for some of the test steps, at the end a test protocol shall be displayed and printed.

Separation into steps


1. Display of the test instructions
2. Display of additional information (optional)
3. Entry of serial number and test operator's name
4. Check of the serial number
5. Error message in case of wrong serial number
6. Collection of measured data (pressure and volume flow rate)
7. Graphical display of the adjustment values
8. Check of the adjusted values
9. Error message in case of wrong values
10. Display of additional information (optional)
11. Display of the test protocol
12. Printing of the test protocol

Assignment of components


1. Display of the test instructions
input/output component with a time component
2. Display of additional information (optional)
input/output component with a time component; pressing key "Info" as input condition
3. Entry of serial number and test operator's name
input/output component
4. Check of the serial number
logic component; a logic variable will be set if serial number is too short
5. Error message in case of wrong serial number
input/output component with a time component; set logic variable as input condition
6. Collection of measured data (pressure and volume flow rate)
measuring component; definition of variables for the measurands
7. Graphical display of the adjustment values
diagram component; display of both measurands in alignment mode
8. Check of the adjusted values
logic component; setting of a logic variable if at least one measured value is outside tolerance
9. Error message in case of wrong values
input/output component with a time component; set logic variable as input condition
10. Display of additional information (optional)
input/output component with a time component; pressing key "Info" as input condition
11. Display of the test protocol
input/output component with a time component
12. Printing of the test protocol
text protocol component

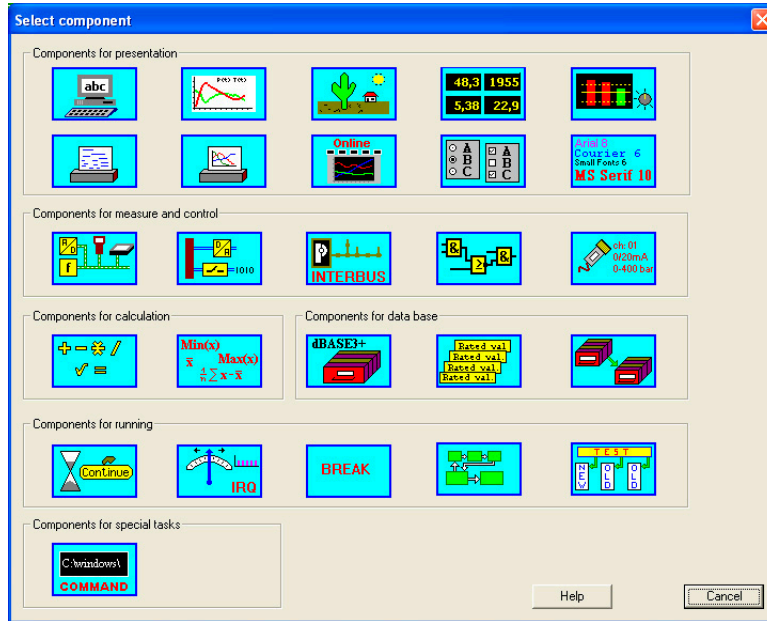
5.1.2 Programming of the test sequence

Create new test sequence

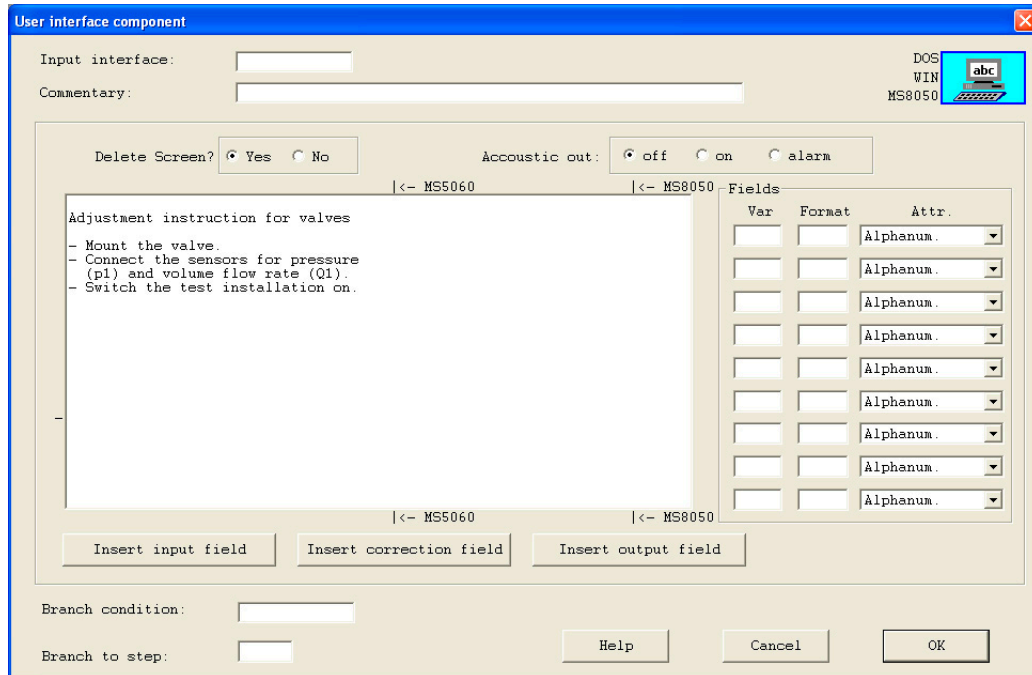
 "File – New":
an empty component will be displayed, „NoName.pad“ is displayed in the title line

1 Component 1: display of information

 „Edit – Append“ (see section 3.3.2 on page 10):




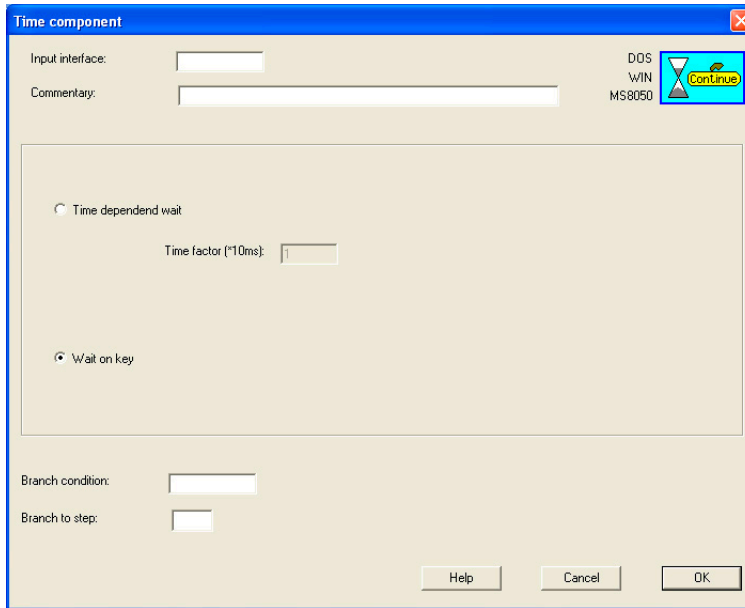
Input/output component (see section 4.2.1 on page 22)



This text shall be displayed at the beginning of the test sequence.


2 Component 2: Wait for key

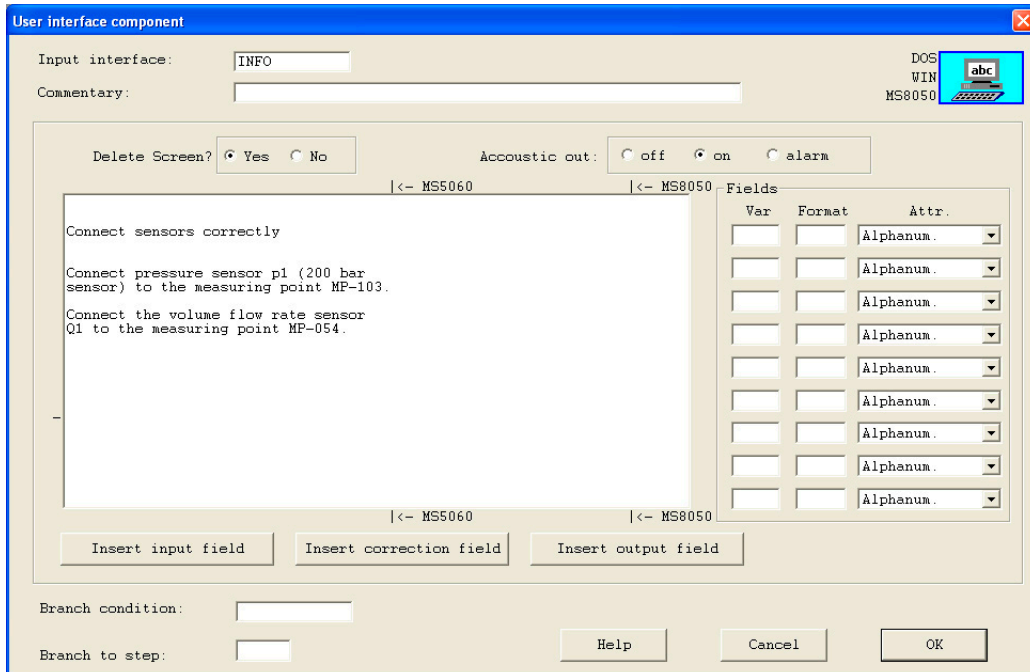
 Time component (see section 4.6.1 on page 56)



This component is required to give enough time that the operator can read the information. The test sequence is stopped until the key “CONTINUE” or “INFO” is pressed.


3 Component 3: display additional information when the key „INFO“ is pressed

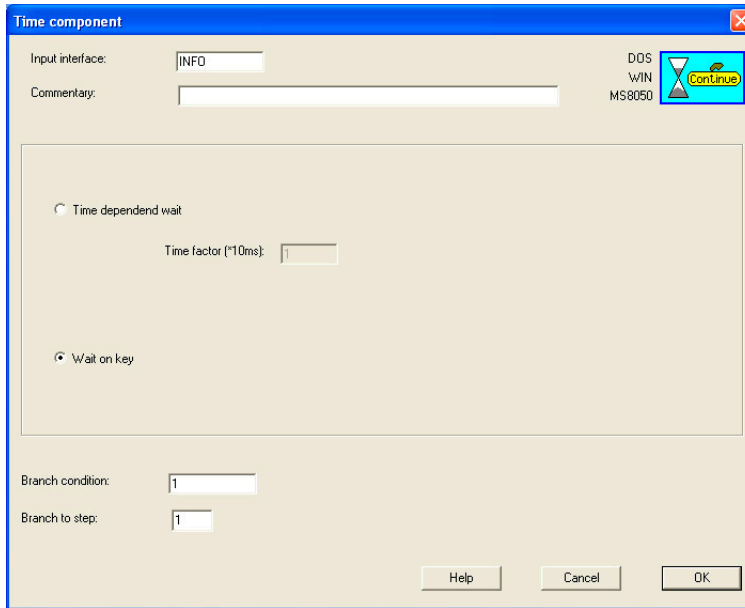
 Input/output component (see section 4.2.1 on page 22)



By defining the entry condition INFO it is assured that the text will only be displayed, if the key „Info“ has been pressed. If the key “Continue” is pressed in the prior component, this will be skipped.


4 Component 4: Wait for key

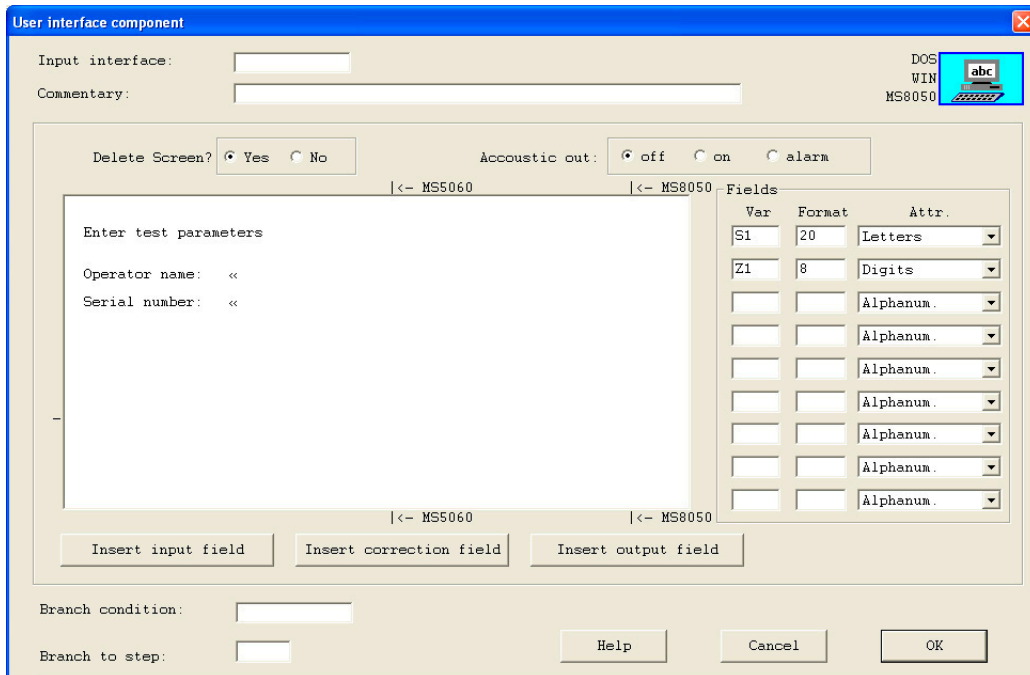
 Time component (see section 4.6.1 on page 56)



This component is required to give time to the operator to read the information. Due to the entry condition “INFO” this component will only be executed, if the key “Info” has been pressed. The test sequence is stopped until the operator presses the key “Continue”. Then there will be a jump back to component 1. Branch condition “1” means “always true”, the target is component 1.

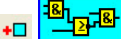
5 Component 5: Input of serial number and operator name

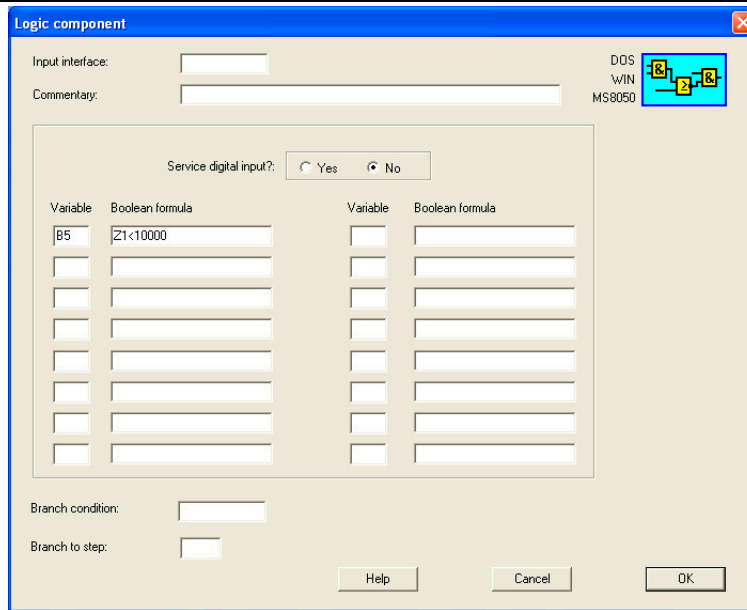
 Input/output component (see section 4.2.1 on page 22)



The operator has to enter his name (max. 20 characters) and the serial number of the valve (max. 8 digits). The name is saved in the text variable S1, the serial number in the integer variable Z1.


6 Component 6: Serial number check

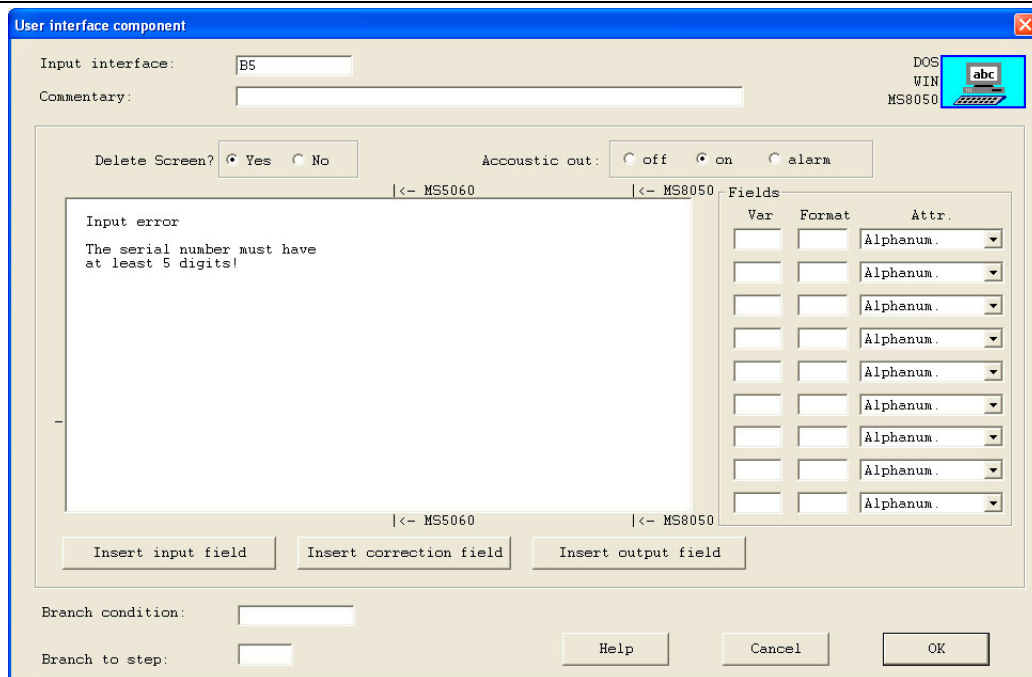
 Logic component (see section 4.3.4 on page 45)



You want to check, whether the entered serial number has at least five digits. The logic variable B5 is defined that will be set, if Z1 (the variable where the serial number is saved) is smaller than 10000, that means it has maximal four digits.


7 Component 7: Error message if serial number is too short

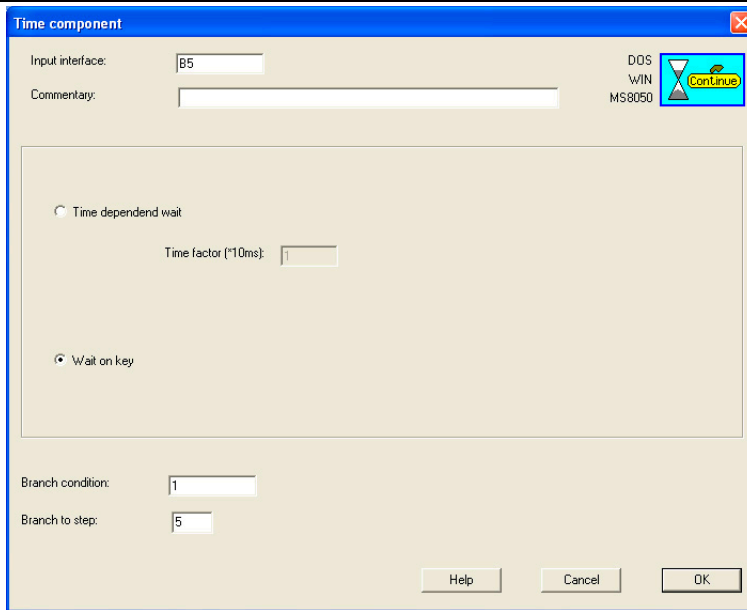
 Input/output component (see section 4.2.1 on page 22)



This component will be executed, if the variable B5 is set (if „Z1 < 10000“, see prior component). The error message will be displayed. If a valid serial number has been entered, this component will be skipped.


8 Component 8: Wait for key

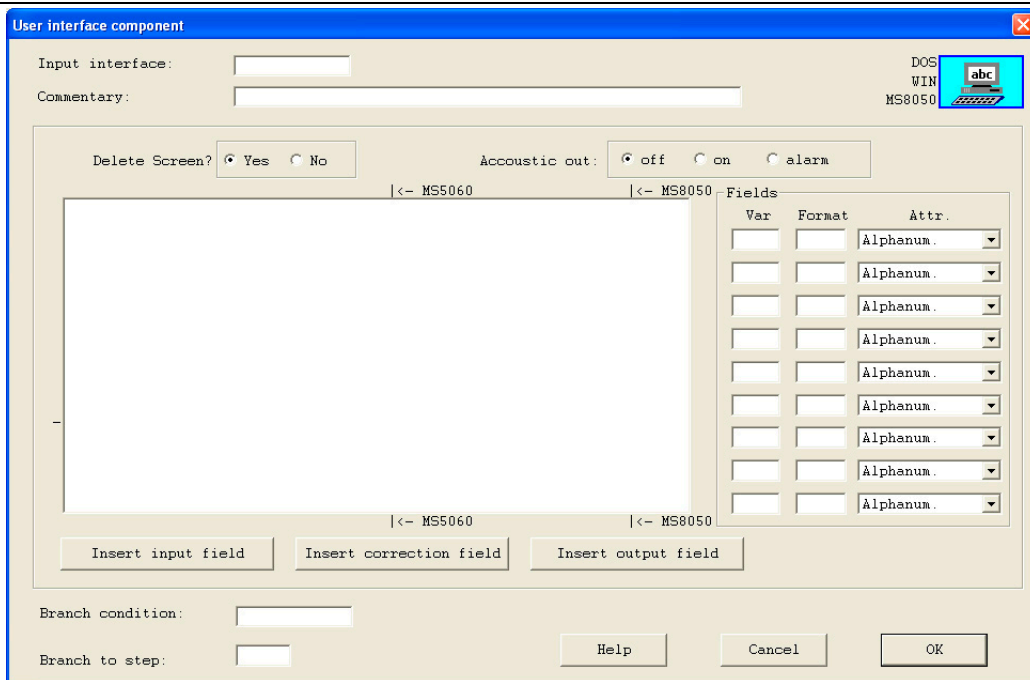
 Time component (see section 4.6.1 on page 56)



This component is required to give time to the operator to read the displayed error message. It will only be executed, if the variable B5 is set. Then the test sequence will be stopped, until the key “Continue” is pressed. If the key “Continue” is pressed, there will be a jump to component 5 (branch condition is “1” = “always true”).

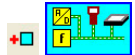
9 Component 9: Delete screen

 Input/output component (see section 4.2.1 on page 22)



This component is used to clear the screen. Then it will not be necessary to clear the screen in the coming measure component what avoids jittering during the measurements.

10 Component 10: Execute measurements



Measure component (see section 4.3.1 on page 39)

The components requests the measurands p1 and Q1 from the measuring instrument. As soon as the values are available, the component will be ended.

11 Component 11: Display of measured values as bargraphs

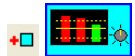



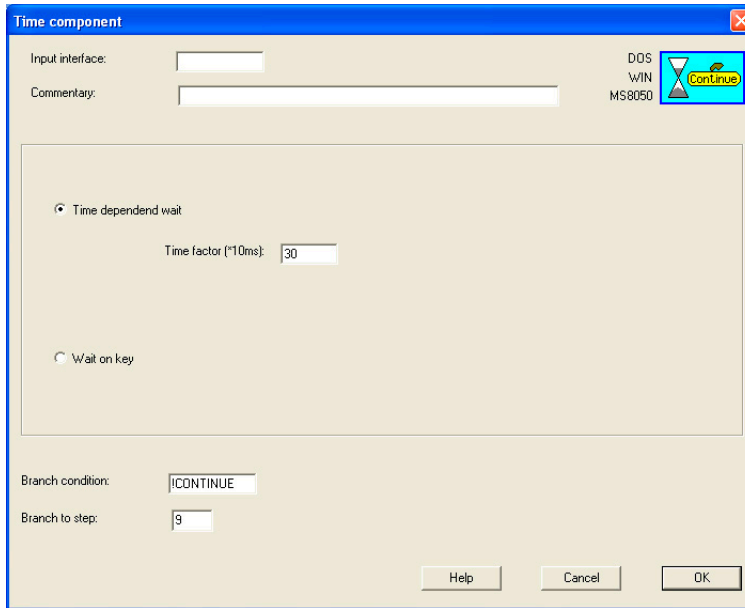
Diagram component (see section 4.2.5 on page 31)

Variable	Name	Minimum	Maximum	Set point	-Tolerance	+Tolerance
p1	p (bar)			120	110	135
Q1	Q (l/min)			40	30	50

The measurands requested in the measure component (see above) are presented in the “Alignment” mode. You have to define variable, name, must value and tolerances for both. As an option you may enter a title and set the other options in accordance to your requirements.


1 2 Component 12: Cycle for the refreshment of the diagram

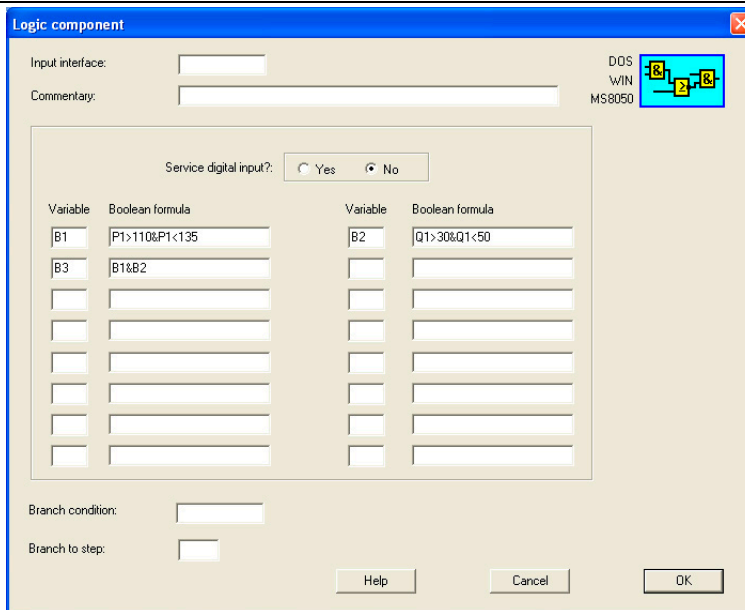
 Time component (see section 4.6.1 on page 56)



To refresh the measured values in the diagram, you define a waiting time of 0.3 seconds (30 x 10 ms) here. Then there will be a jump back to component 9 (measure component). This cycle will be executed until the key "Continue" is pressed. Therefore, the branch condition "!CONTINUE" is defined that means "not continue".


1 3 Component 13: Check of correct valve adjustment

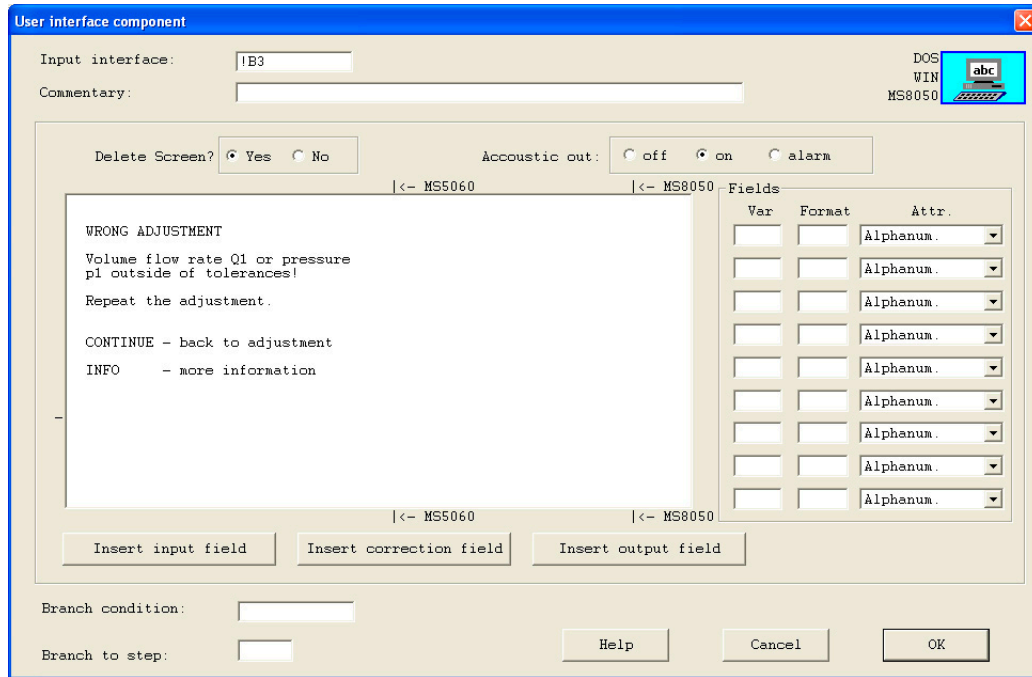
 Logic component (see section 4.3.4 on page 45)



If the measured pressure p1 is larger than 110 (lower tolerance) and smaller than 135 (upper tolerance), the logic variable B1 is set. If the measured volume flow Q1 is larger than 20 and smaller than 50, the variable B2 will be set. B3 will be set, if B1 and B2 are set.


1 4 Component 14: Error message in case of wrong valve adjustment

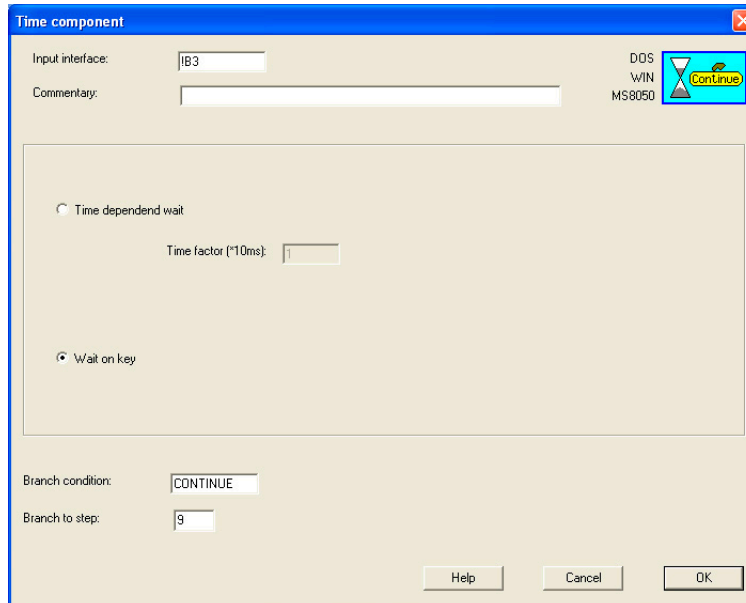
 Input/output component (see section 4.2.1 on page 22)



Due to the input condition „IB3” (variable B3 is not set), the error message will only be displayed, if at least one measurand is outside the tolerances. Additionally an alarm tone will be triggered.


1 5 Component 15: Wait for key

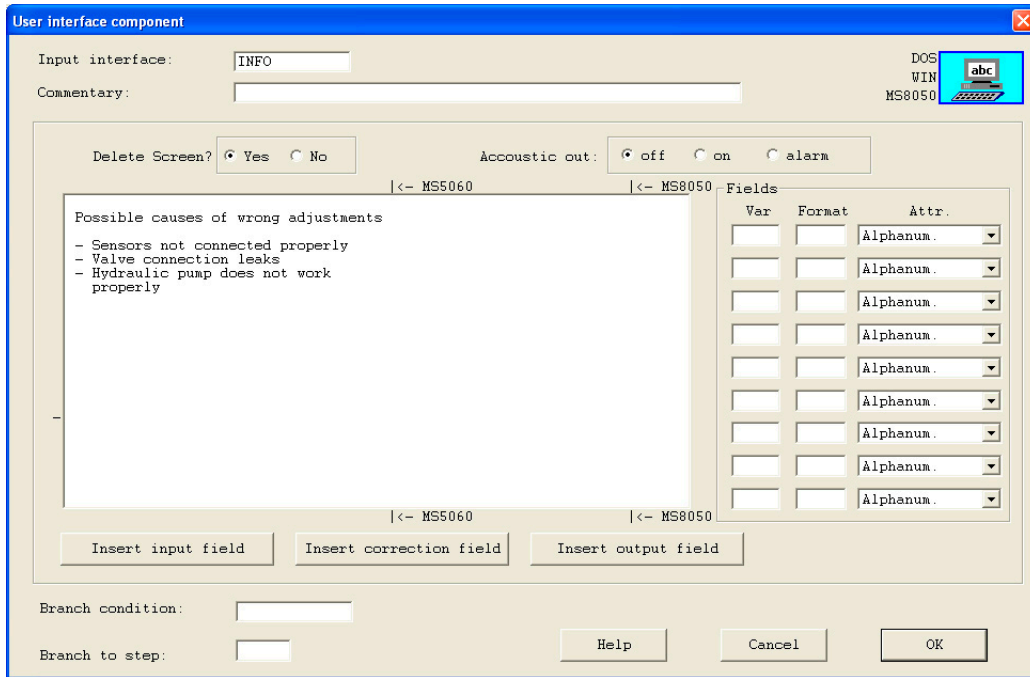
 Time component (see section 4.6.1 on page 56)



This component will only be executed, if the variable B3 is not set (see component above). The error message will be displayed, until the operator presses one of the keys “Continue” or “Info”. If he presses the key “Continue”, the test sequence jumps back to component 9.


16 Component 16: Display of additional information

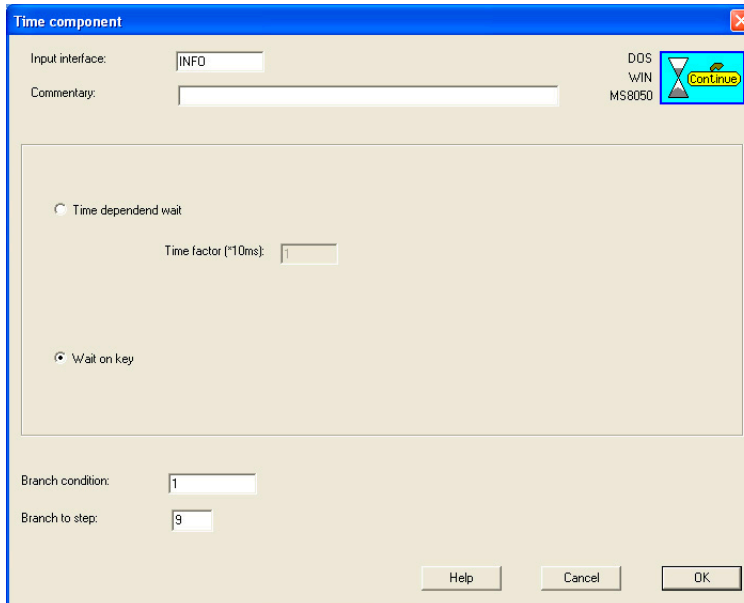
 Input/output component (see section 4.2.1 on page 22)



Due to the input condition „INFO“, this component will only be executed when the key “Info” has been pressed.


17 Component 17: Wait for key

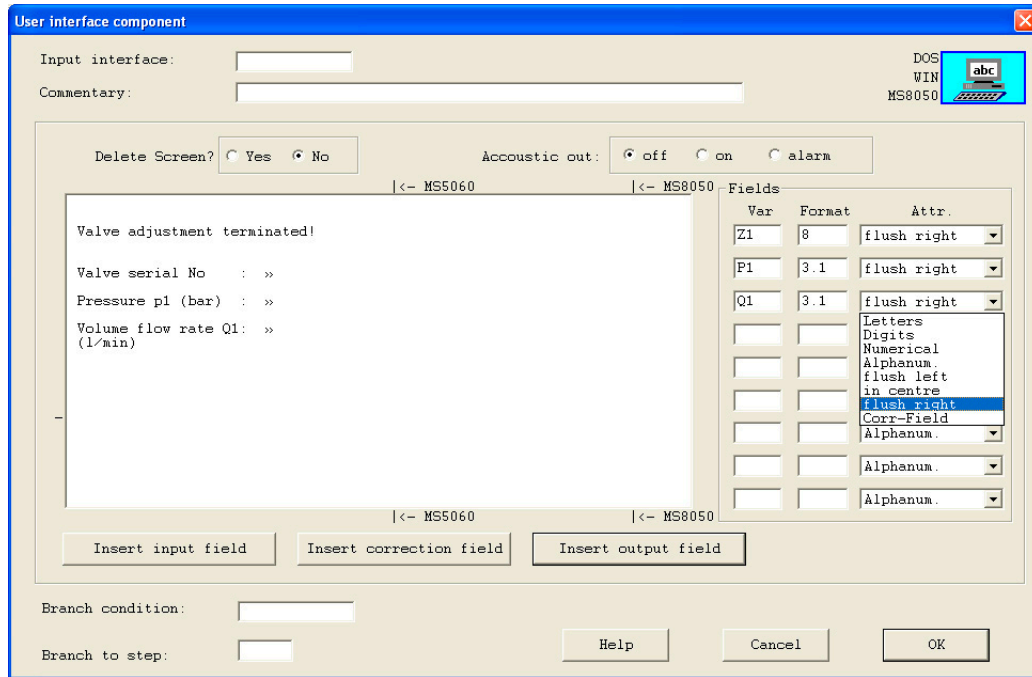
 Time component (see section 4.6.1 on page 56)



This component will only be executed, if the key „Info“ has been pressed. This gives time to the operator to read the error message. After pressing the key “Continue”, the test sequence jumps back to component 9, where the adjustment of the valve can be repeated.


1 8 Component 18: Display of the valve setting

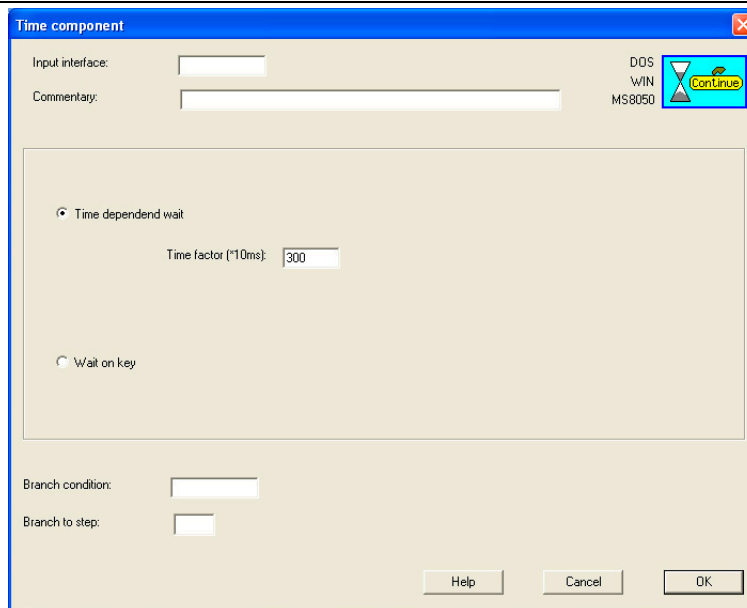
 Input/output component (see section 4.2.1 on page 22)



The most important information on the valve adjustment will be displayed with this component. Output fields are positioned, where the desired variables are displayed. The format of the output fields determines the type of display. Here the serial number is displayed with eight digits, pressure and volume flow rate with one decimal positions, each. All values will be aligned at the right side.

1 9 Component 19: Waiting time

 Time component (see section 4.6.1 on page 56)

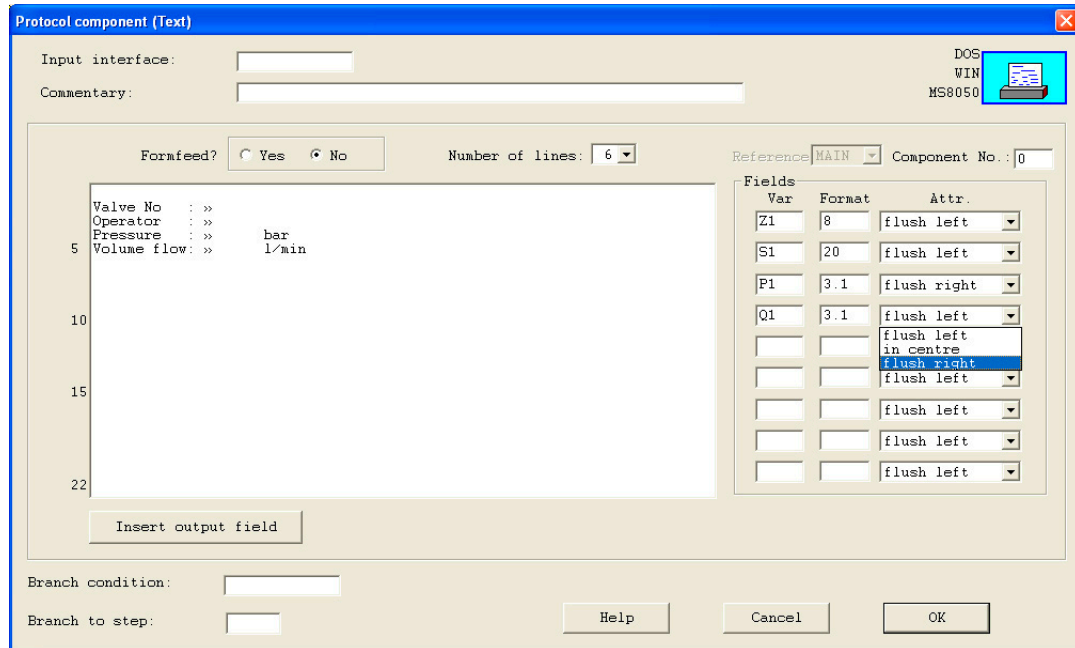


The waiting time is 3 seconds (300 x 10 ms) and gives time to the operator to read the displayed values. Then the next component will be executed.

20 Component 20: Print adjustment protocol



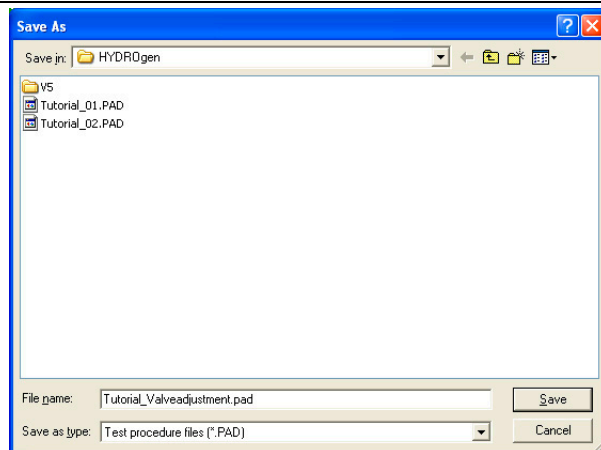
Text protocol component (see section 4.2.6 on page 32)



The four variables „Valve number“, „Operator name“, „Pressure“ and „Volume flow rate“ will be printed as a list. The page feed is suppressed to print several adjustment protocols on one page. Six lines are used for the printout.

21 Component 21: Save test sequence

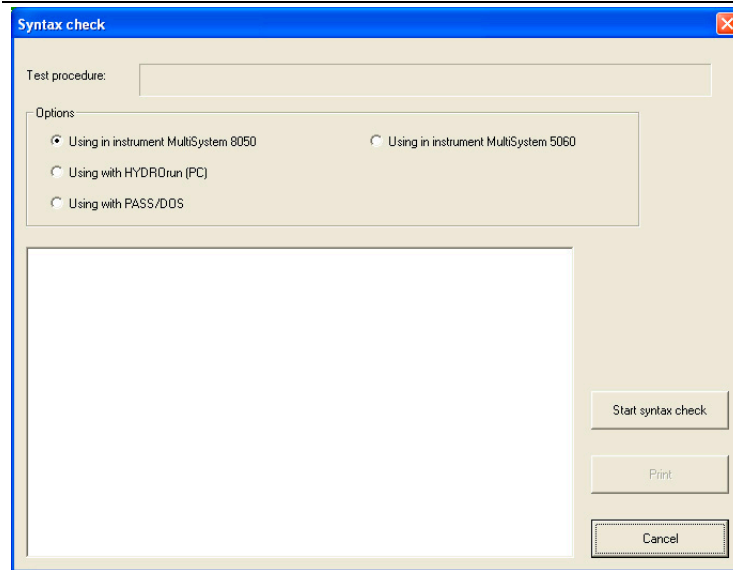
File – Save



Save the test sequence with the desired name.

2 2 Component 22: Run syntax test

Edit – Preliminary test



Enable the option that corresponds with the desired use of the test sequence. Then click on “Start syntax check”. Please see section 3.3.2 on page 10 for further information.

5.2 Use component module

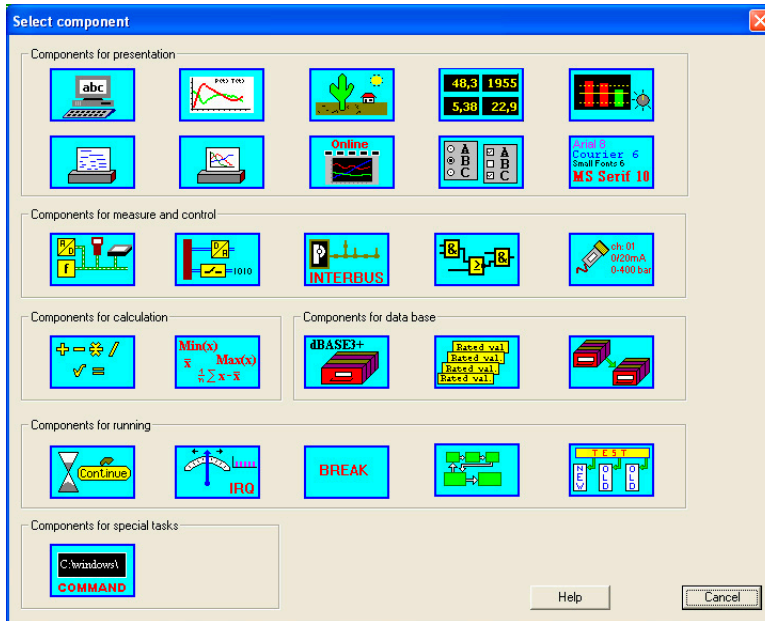
A long test sequence is planned, some measurands shall be transferred and printed at several positions. To avoid programming the same components several times, a module is programmed.

Create new test sequence

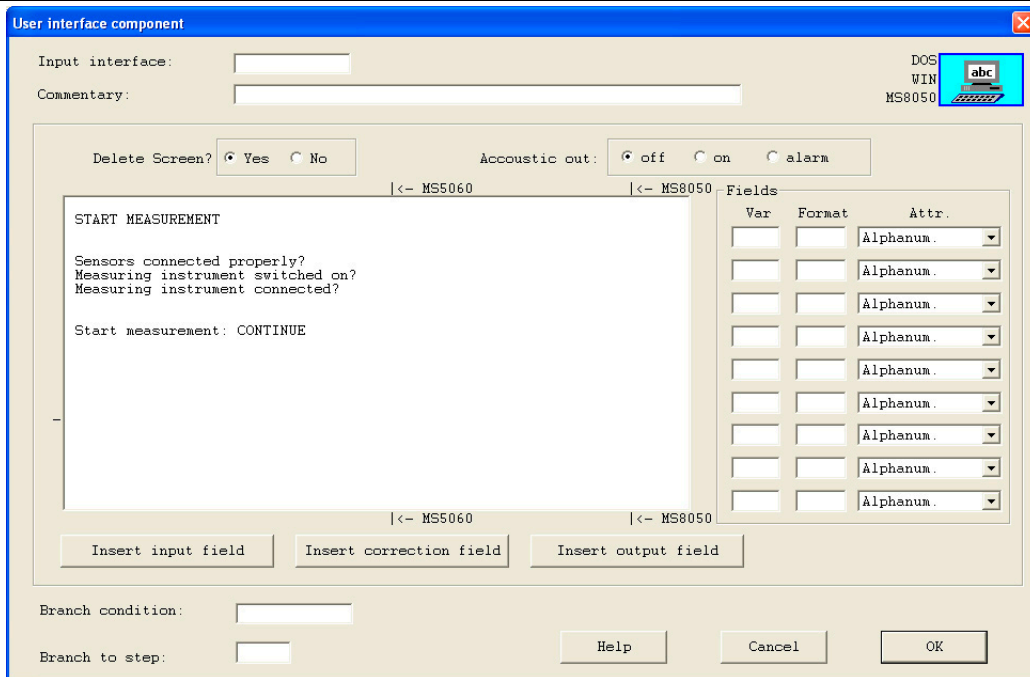
 “File – New”: an empty component will be displayed, „NoName.pad“ is shown in the title line.

1 Component 1: Display of information

„Edit – Append“ (see section 3.3.2 on page 10):




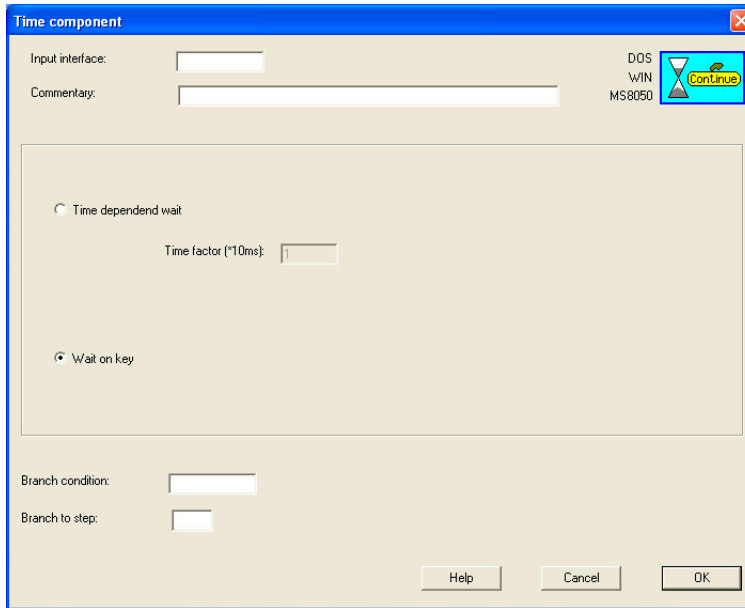
Input/output component (see section 4.2.1 on page 22)



This text shall be displayed at the beginning of the module.


2 Component 2: Wait for key

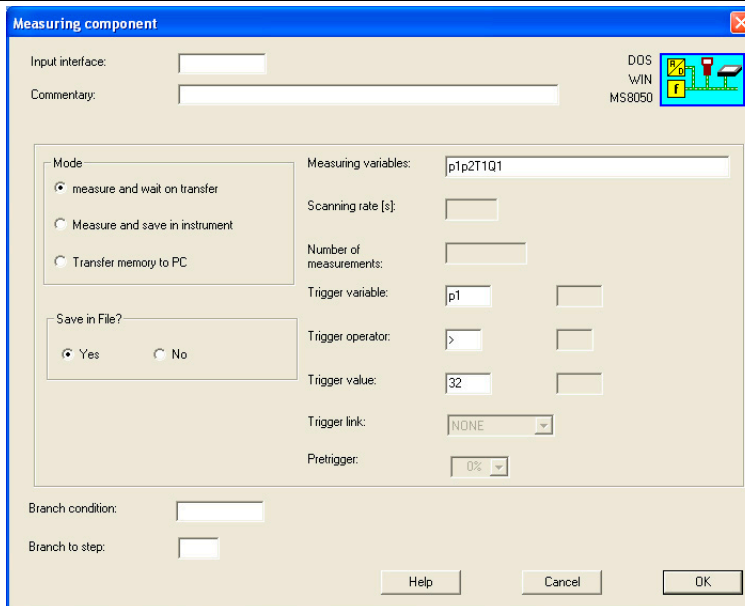
 Time component (see section 4.6.1 on page 56)



This component is required to give the operator time to read the information. The module is stopped, until the key “Continue” is pressed.

3 Component 3: Request measured values

 Measure component (see section 4.3.1 on page 39)

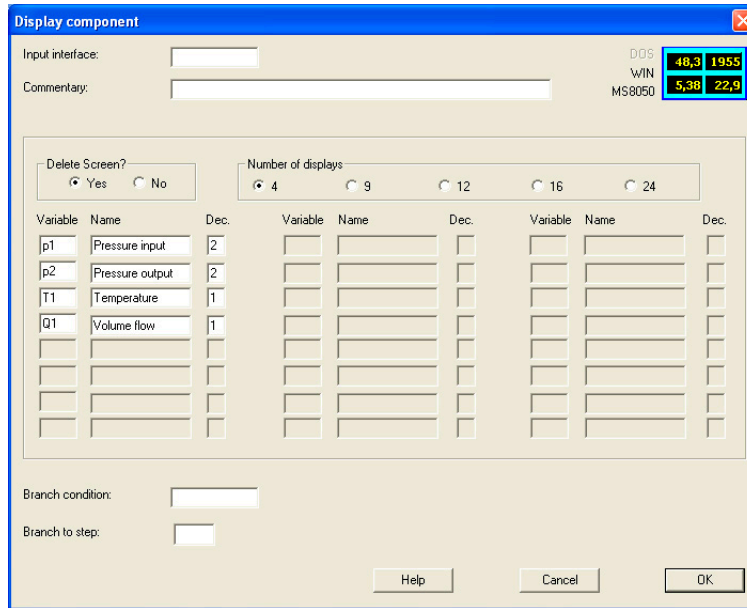


The measurands p1, p2, T1 and Q1 are requested from the connected measuring instrument. A trigger has been defined to assure that the measurement will not be executed, before pressure p1 is at least 32 bar. When all measured values are transferred, the next component will be executed.

4 Component 4: Display measured values



Display component (see section 4.2.4 on page 30)

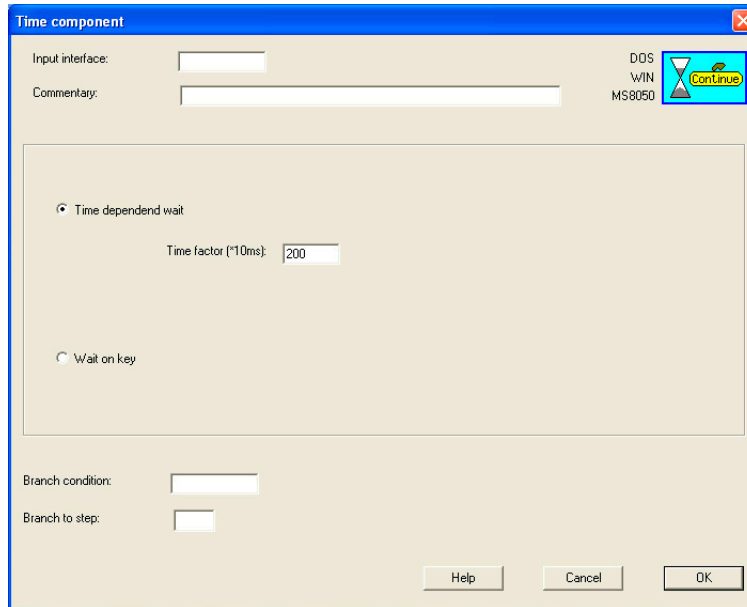


The requested measured values will be shown on four displays. The desired measurands are entered, their names and the desired number of decimal positions were defined.

5 Component 5: Waiting time




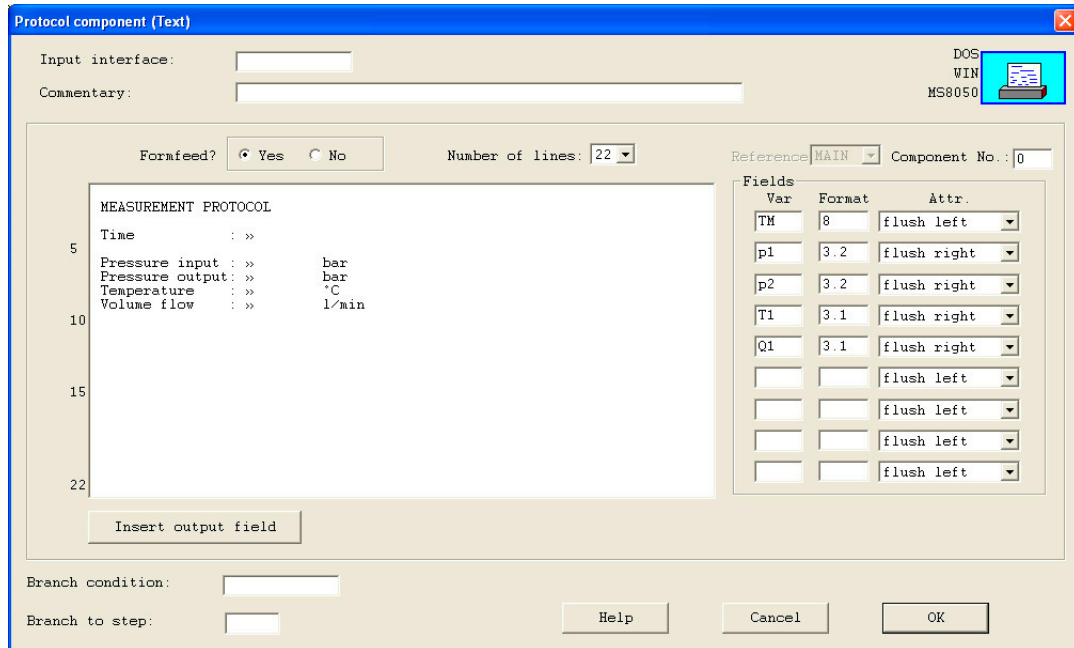
Time component (see section 4.6.1 on page 56)



The measured values shall be displayed for two seconds (200 x 10 ms). Then the next component will be executed.

6 Component 6: Printing of measure protocol

 Text protocol component (see section 4.2.6 on page 32)

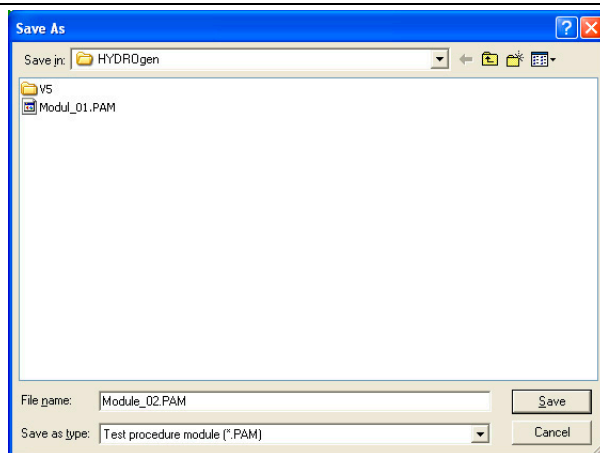


At the end, the transferred measured values shall be printed. Since “Page feed – Yes” is activated, each protocol will be printed on a new page.

The current time shall be printed together with the four measurands. For that the variable TM is used that shall be printed with eight characters and left-aligned. Below, the measured values shall be printed with different numbers of decimal positions and right-aligned.

7 Save test sequence

File – Save

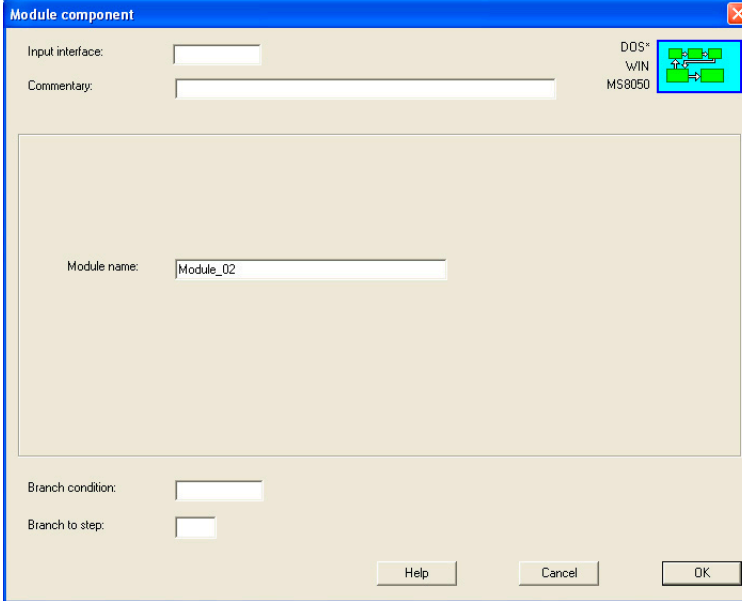


Save the module with the desired name. Assure to use the file type “Test procedure module” and to save it in the same directory like the main test sequence. The name of the file must be entered into the module component of the main test sequence later.

8 Integrate module into the main test sequence



Module component (see section 4.6.4 on page 61)



Module component

Input interface:

Commentary:

Module name:

Branch condition:

Branch to step:

Help Cancel OK

You have to use the module component at all positions in the main test sequence, where the module shall be integrated. Enter the name of the module. When this component is executed, all components of the module will be executed before the next component of the main test sequence will be executed.