

Rexroth Rho 4 ROPS4 Online

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Software manual



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ROPS4 Online

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- the use of the application ROPS4 Online

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Overview of all manuals

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Safety Instructions

1 Safety Instructions

Please read this manual before you startup the rho4.
Store this manual in a place to which all users have access at any time.

1.1 Intended use


This instruction manual presents a comprehensive set of instructions and information required for the standard operation of the described products. The described products are used for the purpose of operating with a robot control rho4.

The products described

- have been developed, manufactured, tested and documented in compliance with the safety standards. These products normally pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.
- comply with the requirements of
 - the EMC Directives (89/336/EEC, 93/68/EEC and 93/44/EEC)
 - the Low-Voltage Directive (73/23/EEC)
 - the harmonized standards EN 50081-2 and EN 50082-2
- are designed for operation in industrial environments, i.e.
 - no direct connection to public low-voltage power supply,
 - connection to the medium- or high-voltage system via a transformer.

The following applies for application within a personal residence, in business areas, on retail premises or in a small-industry setting:

- Installation in a control cabinet or housing with high shield attenuation.
- Cables that exit the screened area must be provided with filtering or screening measures.
- The user will be required to obtain a single operating license issued by the appropriate national authority or approval body. In Germany, this is the Federal Institute for Posts and Telecommunications, and/or its local branch offices.

 **This is a Class A device. In a residential area, this device may cause radio interference. In such case, the user may be required to introduce suitable countermeasures, and to bear the cost of the same.**

The faultless, safe functioning of the product requires proper transport, storage, erection and installation as well as careful operation.

Safety Instructions

1.2 Qualified personnel

The requirements as to qualified personnel depend on the qualification profiles described by ZVEI (central association of the electrical industry) and VDMA (association of German machine and plant builders) in:

Weiterbildung in der Automatisierungstechnik

edited by: ZVEI and VDMA

MaschinenbauVerlag

Postfach 71 08 64

D-60498 Frankfurt.

The present manual is designed for RC technicians. They need special knowledge on handling and programming robots.

Interventions in the hardware and software of our products, unless described otherwise in this manual, are reserved to specialized Rexroth personnel.

Tampering with the hardware or software, ignoring warning signs attached to the components, or non-compliance with the warning notes given in this manual may result in serious bodily injury or damage to property.

Only electrotechnicians as recognized under IEV 826-09-01 (modified) who are familiar with the contents of this manual may install and service the products described.

Such personnel are

- those who, being well trained and experienced in their field and familiar with the relevant norms, are able to analyze the jobs being carried out and recognize any hazards which may have arisen.
- those who have acquired the same amount of expert knowledge through years of experience that would normally be acquired through formal technical training.

With regard to the foregoing, please note our comprehensive range of training courses. Please visit our website at

<http://www.boschrexroth.com>

for the latest information concerning training courses, teachware and training systems. Personal information is available from our Didactic Center Erbach,

Telephone: (+49) (0) 60 62 78-600.

Safety Instructions

1.3 Safety markings on products

Warning of dangerous electrical voltage!



Warning of danger caused by batteries!



Electrostatically sensitive components!



Warning of hazardous light emissions
(optical fiber cable emissions)!



Disconnect mains power before opening!



Lug for connecting PE conductor only!



Functional earthing or low-noise earth only!



Connection of shield conductor only

Safety Instructions

1.4 Safety instructions in this manual



DANGEROUS ELECTRICAL VOLTAGE

This symbol is used to warn of a **dangerous electrical voltage**. The failure to observe the instructions in this manual in whole or in part may result in **personal injury**.



DANGER

This symbol is used wherever insufficient or lacking compliance with instructions may result in **personal injury**.



CAUTION

This symbol is used wherever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

☞ This symbol is used to draw the user's attention to special circumstances.

★ This symbol is used if user activities are required.

Safety Instructions

1.5 Safety instructions for the described product**DANGER**

Danger of life through inadequate EMERGENCY-STOP devices! EMERGENCY-STOP devices must be active and within reach in all system modes. Releasing an EMERGENCY-STOP device must not result in an uncontrolled restart of the system! First check the EMERGENCY-STOP circuit, then switch the system on!

**DANGER**

**Danger for persons and equipment!
Test every new program before starting up a system!**

**DANGER**

**Retrofits or modifications may adversely affect the safety of the products described!
The consequences may include severe injury, damage to equipment, or environmental hazards. Possible retrofits or modifications to the system using third-party equipment therefore have to be approved by Rexroth.**

**DANGER**

Do not look directly into the LEDs in the optical fiber connection. Due to their high output, this may result in eye injuries. When the inverter is switched on, do not look into the LED or the open end of a short connected lead.

**DANGEROUS ELECTRICAL VOLTAGE**

Unless described otherwise, maintenance works must be performed on inactive systems! The system must be protected against unauthorized or accidental reclosing.

Measuring or test activities on the live system are reserved to qualified electrical personnel!

Safety Instructions



CAUTION

Danger to the module!

Do not insert or remove the module while the controller is switched ON! This may destroy the module. Prior to inserting or removing the module, switch OFF or remove the power supply module of the controller, external power supply and signal voltage!



CAUTION

use only spare parts approved by Rexroth!



CAUTION

Danger to the module!

All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

The following protective measures must be observed for modules and components sensitive to electrostatic discharge (ESD)!

- Personnel responsible for storage, transport, and handling must have training in ESD protection.
- ESD-sensitive components must be stored and transported in the prescribed protective packaging.
- ESD-sensitive components may only be handled at special ESD-workplaces.
- Personnel, working surfaces, as well as all equipment and tools which may come into contact with ESD-sensitive components must have the same potential (e.g. by grounding).
- Wear an approved grounding bracelet. The grounding bracelet must be connected with the working surface through a cable with an integrated 1 MΩ resistor.
- ESD-sensitive components may by no means come into contact with chargeable objects, including most plastic materials.
- When ESD-sensitive components are installed in or removed from equipment, the equipment must be de-energized.

Safety Instructions

1.6 Documentation, software release and trademarks

Documentation

The present manual provides information on the application ROPS4 On-line.

Overview of available documentation	Part no.	
	German	English
Rho 4.0 Connectivity Manual	1070 072 364	1070 072 365
Rho 4.0 System description	1070 072 366	1070 072 367
Rho 4.1/IPC 40.2 Connectivity Manual	R911308219	R911308220
Rho 4.1/BT155, Rho 4.1/BT155T, Rho 4.1/BT205 Connectivity manual	1070 072 362	1070 072 363
Rho 4.1, Rho 4.1/IPC300 Connectivity manual	1070 072 360	1070 072 361
Control panels BF2xxT/BF3xxT, connection	1070 073 814	1070 073 824
Rho 4.1 System description	1070 072 434	1070 072 185
ROPS4/Online	1070 072 423	1070 072 180
BAPS plus	1070 072 422	1070 072 187
BAPS3 Short description	1070 072 412	1070 072 177
BAPS3 Programming manual	1070 072 413	1070 072 178
Control functions	1070 072 420	1070 072 179
Signal descriptions	1070 072 415	1070 072 182
Status messages and warnings	1070 072 417	1070 072 181
Machine parameters	1070 072 414	1070 072 175
PHG2000	1070 072 421	1070 072 183
DDE-Server 4	1070 072 433	1070 072 184
DLL-Library	1070 072 418	1070 072 176
Rho 4 available documentation on CD ROM	1070 086 145	1070 086 145

 **In this manual the floppy disk drive always uses drive letter A:, and the hard disk drive always uses drive letter C:.**

Special keys or key combinations are shown enclosed in pointed brackets:

- Named keys: e.g., <Enter>, <PgUp>,
- Key combinations (pressed simultaneously): e.g., <Ctrl> + <PgUp>

Safety Instructions

Release

 **This manual refers to the following versions:**

Hardware version: rho4

Software release: ROPS4

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DeviceNet® is a registered trade mark (TM) of ODVA (Open DeviceNet Vendor Association, Inc.).

General information

2 General information



Online, the component of the robot programming system ROPS4 described here, is a consequent further development of ROPS3, the programming system for rho3 controls. Online of ROPS4 has been adapted to the new control generation rho4 and substantially enhanced in its capacity by BAPS plus, an integrated graphical RC programming system.

Online furthermore contains tools permitting a comfortable handling of the rho4 control. These tools make it possible for processes in the control to be influenced and monitored. Online contains all functions required to manage data in the control and to exchange data between PC and rho4. With integrated diagnosis modules it is possible to display kinematics information and all kinds of quite different position values of the mechanics. The dynamic display of quite different input/output signals provides important information on the interaction between adaptation control and mechanics. With an integrated point editor it is possible in a very easy way to enter and change geometric data both online, i. e. directly in the control, and offline.

By the integrated call of machine parameter converters it is possible to convert machine parameter records into readable ASCII files and to generate from ASCII files again parameter records that can be read by the control.

After the installation of ROPS4, a new file appears in the Windows desktop with the designation rops4. The three links in the file make it possible to call 'Online' and the two machine parameter converters.

The following table shows the assignment of the different icons to the individual programs and indicates the respective documentations.

Icon	Program description	Title of documentation
	Assembly of different tools	ROPS4 Online Software Manual
	Converter for machine parameters (ASCII to BIN and BIN to ASCII)	Machine Parameter Software Manual

Online can fully be operated via the keyboard. The ten most frequently required functions can be activated directly via function keys, i. e. without any deviation through a menu selection. Using a mouse will increase the operation comfort, yet is not obligatorily required. In the following description it is refrained from explicitly explaining the operation with the mouse. The whole handling of Online (by mouse and keyboard) corresponds to the general Windows rules.

Online is a Windows application that requires Windows95, WindowsNT or WindowsXP. The available languages are German and English.

General information

The RC programming system BAPS plus and the translator of Online are protected by a so-called software dongle. After the installation, these functions must be enabled by entering a computer key. This key is a number determined by Bosch Rexroth.

Various functions for the license management are available on the Online surface. To apply for a license, the menu points 'Licensing/applying' must be called. The computer key indicated there exactly describes the computer on which ROPS4 has been installed. It has to be sent to Bosch Rexroth using the enclosed fax form. From this number an associated key code is computed which has to be entered into the input field. The appropriate key code then enables the protected functions. Detailed instructions for licensing are to be found in chapter 3.10 'Licensing'.

The license application and granting procedure is additionally described in the README_ROPS4.WRI file. An application form for the enable key is filed in the FAX_ROPS4.WRI file.

General information

2.1 Long file names

The control accepts file names with a max. length of eight characters for the name and three characters for the file extension. Before loading a file into the control, Online cuts off all file names having a length of more than eight characters. To exclude any problems it is therefore recommendable to restrict the names of files to be edited by Online to a length of max. eight characters.

General information

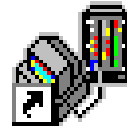
Notes:

Activation and functions of Online

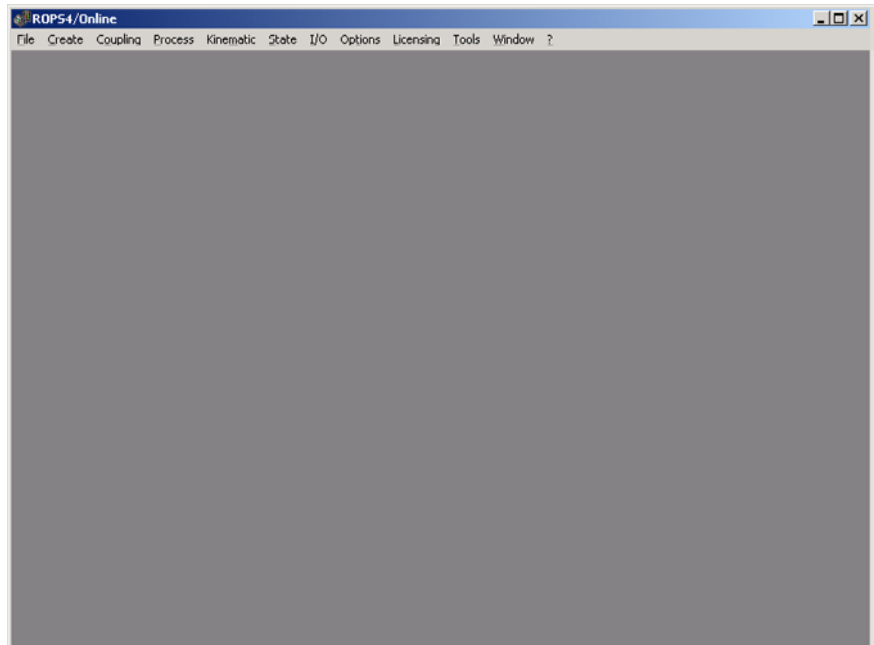
3 Activation and functions of Online

Call of Online

Online is located in the 'ROPS4' directory and started by clicking on the following symbol:



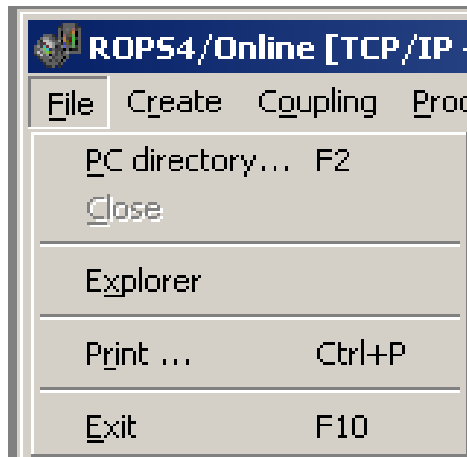
The main window consists of the main menu, the title line (with ROPS4/Online text) and the function key box which is shown at the right of the window. After the start of Online the main menu is active and the title line is displayed inverted. Whenever selecting a main menu point, a pull-down menu is opened that offers further selection possibilities. The display of the function key box is not absolutely required, see chapter 4.



Activation and functions of Online

3.1 File

Under the menu item 'File' a list of files can be displayed on the PC. There are furthermore the possibilities of starting the Explorer of Windows, printing files or terminating Online.



The texts F2 and F10 serve as an information that these menu points can directly be selected by function keys. With opened pull-down menu, the function keys are, however, inactive. The pull-down menu can be closed again by pressing <Esc>.

Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor keys and activate them by pressing <Enter>

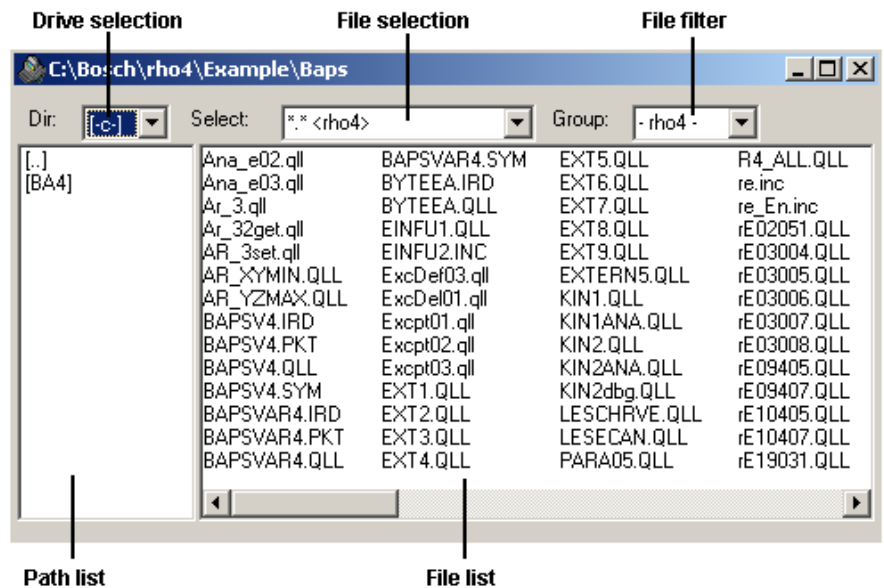
3.1.1 PC directory

When selecting this menu point a window appears on the screen that shows a list of files on the PC. This list gives an overview of data stocks and path structures and offers the possibility of marking files to be transferred to the control.

Creation of a file list

- from the main menu by simultaneous pressing of <Alt> and <F> and subsequent pressing of <P> or <F2>
- from the pull-down menu by <P> or clicking on 'PC directory...'

Activation and functions of Online



The illustration shows a list of all files (*.*) of the Baps directory on the C drive. The current path is in the title line of the dialog (here: C:\Bosch\rho\Example\Baps). The PC list is shown in a document window and can be displayed simultaneously with other document windows, e. g. basic information. This window can be placed anywhere on the screen, can be changed in size and can also be reduced to a symbol, see point 3.11.1.

Activation and functions of Online

Control elements of the PC list

Path list	This list shows the path structure of the current drive. The first entry of this list is the so-called main directory. All subsequent entries are subdirectories, which again can contain their own subdirectories. The symbol [..] at the beginning of this list indicates that you are in a subdirectory. By selecting this symbol it is possible to return to the next higher level of the directory structure. The current directory is shown in the title line of the window.
File list	This list contains all files in the current directory and offers the possibility of marking files, to be transferred to the control.
Drive selection	The operator can select via this selection list the drive of which the files resp. path structure are to be listed.
File selection	In this selection list, the operator can make a pre-selection of files to be contained in the file list. The entry *.* provides e. g. a listing of all files in the current directory, while the entry *.qll lists all qll files.
File filter	This selection list offers another possibility of listing files with specific attributes. The selection BAPS supplies e. g. only files with the extensions .qll, .ird, .pkt, .sym, .dat, .inc, .bnr and err.

Determine the desired drive

Select the selection list for the drive selection with <Tab>. In doing so, the currently displayed drive designation is displayed inverted. Have the desired drive displayed in the list by using the cursor keys. The lists with the path structure and the files are updated automatically.

Display specific files

Select the selection list for the file selection or for file filters with <Tab>. In doing so, the current content is displayed inverted. Have the desired selection resp. the desired filter displayed by using the cursor keys. The file list is updated automatically.

Mark files to be transferred to the control

- The file names are listed one after the other. Select the file list with <Tab>. The first file name in the list is inverted or framed. Mark the first file name to be transferred with the cursor keys. A whole group of files can be marked by pressing the <Shift> key additionally.

Activation and functions of Online

- The file names in the list are scattered. Select the file list with <Tab>. The first file name in the list is displayed inverted or framed. By pressing <Shift> + <F8> (simultaneously) a switch-over is made, permitting an individual selection. A flashing frame with broken lines can be seen. Move the frame with the cursor keys onto the desired file names and mark them with the <Space> bar (name is displayed inverted). By repeating this procedure it is also possible to undo the marking.
- By pressing <Ctrl> + <A> all files in the list are selected, if the cursor is inside the file list.


 **The actual copying procedure is started by pressing <F5>.**

Closing of the document window

- with <Alt> + <F> and then <C> or
- by acknowledging with <Ctrl> + <F4>

3.1.2 Close

By the pull-down menu point 'Close' a document window opened before is closed again. This menu point can only be selected if at least one document window is opened. If several files are open, the currently active document window, which can be recognized by the inverted title line, is closed. The simultaneous closing of all documents is possible under the main menu point window, see section 3.11.

 **The following chapters describe which actions can be displayed in a so-called document window. The handling of document windows is especially explained under item 3.11.1.**

Switching over between several document windows

- <Ctrl> + <F6> simultaneously

Closing of a document window

- from the main menu by <Alt> + <F> and then <C>
- from the pull-down menu by <C>

Activation and functions of Online

3.1.3 Explorer


Here it is possible for the operator to activate the Windows Explorer without having to leave Online. The Explorer facilitates the file management on the PC. Its handling is not further explained here.

Call of the Explorer

- from the main menu by <Alt> + <F> and then <X>
- from the pull-down menu by <X>

3.1.4 Print file

The "Print" menu point permits the operator to print any ASCII and point files.

 **Point files have to be prepared before being printed. In the title bar of ROPS4 a value in percent is displayed, indicating how far the preparation has progressed.**

Activate 'Print...'

- from the main menu by <Alt> + <F> and then <Ctrl> + <P>
- from the pull-down menu by <Ctrl> + <P>

After having selected 'Print...', at first a dialog box appears on the screen through which the operator can determine the file to be printed. The dialog for the determination of the file is also used at other places in Online and is explained in detail in chapter 8.

After having selected the desired file, a dialog appears on the screen through which the user can select his printer or make printer-specific setups. This dialog is provided by Windows and not further explained here.

In the printout, a line number can be shown or not, see chapter 7.

3.1.5 Exit

By selecting this menu point Online is terminated. All document windows opened before are closed and the Online main window disappears from the screen.

Exit Online

- from the main menu by <Alt> + <F> and then <E> or by <F10>
- from the pull-down menu by <E>

Activation and functions of Online

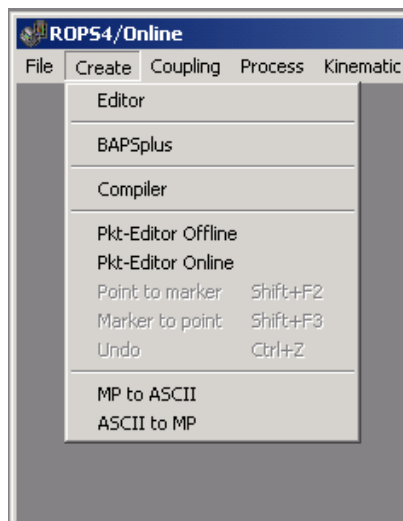
3.2 Create

This menu point summarizes functions by means of which BAPS programs can be edited and translated. They can be created by means of a simple ASCII editor or by a graphic surface. The integrated graphic RC programming system BAPS plus is started from here.

The call of the Online and Offline point editors is also made from here. The three pull-down menu points 'Point to Marker', 'Marker to Point' and 'Undo' are auxiliary tools for the point editor.

When selecting the menu point 'MP to ASCII' resp. 'ASCII to MP', machine parameter records can be converted into readable ASCII files resp. ASCII files can be converted into machine parameter files.

By selecting the main menu point 'Create', the following pull-down menu will be displayed:



The texts <Shift> + <F2>, <Shift> + <F3> and <Ctrl> + <Z> information that these menu points can be selected directly. With opened pull-down menu, the function keys are, however, inactive. For the activation of the individual pull-down menu points the same operation procedure applies as to the main menu points. The pull-down menu can be closed again with <Esc>.

Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor keys and activate it by pressing <Enter>

Activation and functions of Online

3.2.1 Editor

The editor used under this menu item can be determined by the operator. The desired editor can be communicated to Online by entering it into the initialization file ROPS4WIN.ini, see chapter 7. Default is the ROPS4 editor Editor.exe which is available after having installed the ROPS4. This editor permits the simultaneous handling of several documents and also contains its own menu point 'Werkzeug', see section 3.9, through which it is easier to find the BAPS translator among others.

Call of the editors

- from the main menu by <Alt> + <C> and then <C>
- from the pull-down menu by <C>

The further operation depends on the selected editor. The handling of the ROPS4 editors is explained under the menu point 'Hilfe' of the editor.

3.2.2 BAPS plus

The structure-oriented programming system BAPS plus provides a tool by means of which the sequence programs can easily be created and documented according to the top-down methodology. The substantial advantage of this program is the automatic code generation and the possibility of monitoring the process. The user is largely released from learning the BAPS programming language. The program flow is compiled from image symbols in form of a program flowchart.

As to a detailed description of BAPS plus, please refer to the BAPS plus manual which is also integrated into the tool as a help function.

3.2.3 Compiler

By selecting this menu point, the qll programs can be translated. The dialog for the determination of the qll file is also used at other places in Online and is explained in detail in chapter 8.

Activation and functions of Online



Call compiler

- from the main menu by <Alt> + <C> and then <C>
- from the pull-down menu by

This window documents the running translating procedure.

Abort compiler

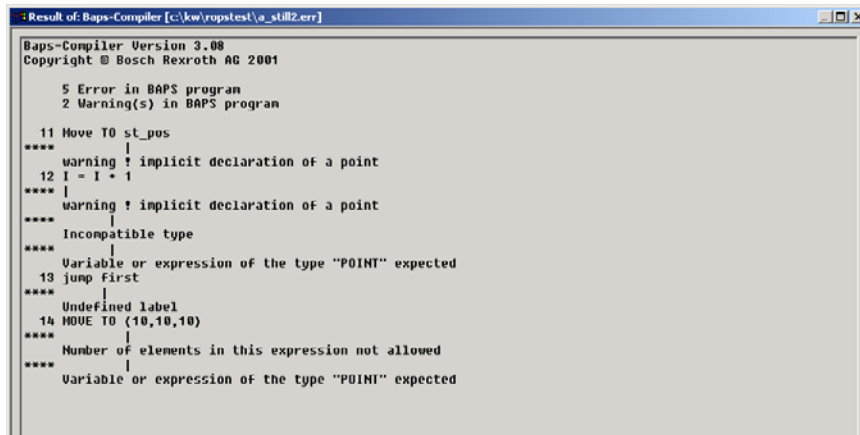
- by pressing <Enter> or by clicking onto the switch field 'Cancel'

 **To avoid an unintended abort, it will be inquired whether the abort is actually desired.**

After having translated a qll file without any errors, a corresponding message appears in the window mentioned before. Then close the window by pressing <Enter> or <Esc>. If errors have been detected during the translation, the error file containing a list of the errors occurred will be displayed.

Activation and functions of Online

Example of an error file



```

Result of Baps-Compiler [c:\kw\ropstest\o_still2.err]
Baps-Compiler Version 3.08
Copyright © Bosch Rexroth AG 2001


5 Error in BAPS program
2 Warning(s) in BAPS program

11 Move TO st_pos
****
|
| warning ! implicit declaration of a point
12 l = l * l
****
|
| warning ! implicit declaration of a point
|
| Incompatible type
****
|
| Variable or expression of the type "POINT" expected
13 jump First
****
|
| Undefined label
14 MOVE TO (10,10,10)
****
|
| Number of elements in this expression not allowed
****
|
| Variable or expression of the type "POINT" expected

```

Working with the error window


- The cursor keys, <Home>, <End>, <PgUp> + <PgDn> permit a scrolling in the error window
- By pressing <Enter> the window is closed

 **The compiler can only be started once from Online. The before mentioned window in which the translation procedure is documented or the window with the error file must always be closed before starting another translation procedure.**

During the translation run, the operator can carry out simultaneously other tasks under Windows resp. in Online. The work is thus not interrupted by a translation run. When terminating Online, a still running translation procedure will remain active.

Termination of the compiler from the Windows level

- Display the window documenting the translation procedure or the window with the error file with <Alt> + <Tab> and terminate the translator by pressing <Enter>

 **Under Windows all currently active applications are offered for selection by pressing <Alt> (and keeping it pressed) and <Tab>. When releasing <Alt>, the application the symbol of which is marked by a frame will be displayed in the foreground.**

Activation and functions of Online

3.2.4 PKT-Editor Offline

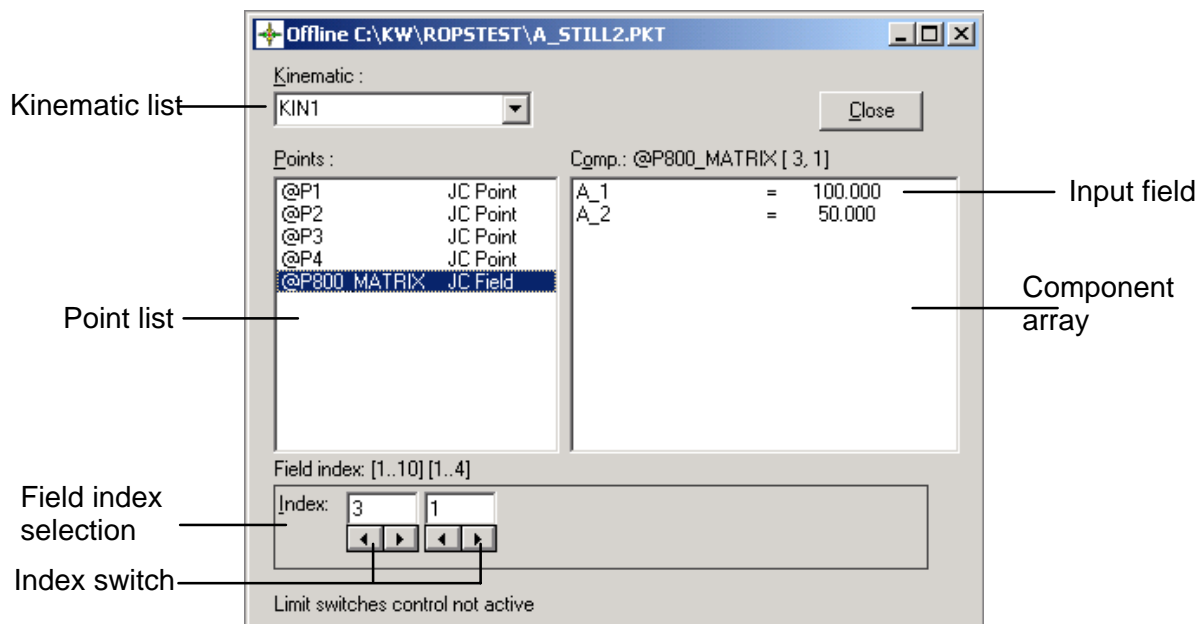
When calling this menu point, a tool is activated that permits the editing of .pkt point files on the PC. The operator is thus able to change geometric data of his movement program in a quick and easy way without having to edit and translate his qll file. Up to max. ten point files can be edited simultaneously, whereby each opened file is shown in a separate document window. This windows can be placed anywhere on the screen and also be changed in size.

Call of the Offline point editor

- from the main menu by <Alt> + <C> and then <F>
- from the pull-down menu by <F>

After having called the point editor, the operator has to name the point file the geometric data of which he wants to change. The dialog for the determination of the files is also used at other places in Online and is explained in detail in chapter 8.

After having made the file selection, the document window of the actual point editor appears on the screen:



Activation and functions of Online

Control elements of the point editor

- | | |
|----------------|---|
| Kinematic list | This selection list contains all kinematics for which geometric data are stored in the point file. When the operator has selected a specific kinematic from this list, only those points are displayed in the point list that belong to this kinematic. |
| Point list | List of all points contained in a point file. If a specific kinematic has been selected from the kinematic list, also only the points belonging to this kinematic are displayed. The point name is followed by a short information on the type of point, a JC point is e. g. a point in the machine coordinates; a JC array is an array with points in machine coordinates. |

Particularity

The point names of a pkt file are displayed in alphabetical order. With a high number of points it is very difficult to find a specific point by scrolling. Windows therefore offers the possibility of making a first orientation in this list by entering the first letter. With this entry, the bar graph is placed onto the first point name that begins with this letter. A repetition of the entry places the bar graph onto the second point names etc. This possibility is sufficient for the selection of points in world coordinates. When selecting a point in machine coordinates, which is characterized by preceding @, @ and a letter have to be entered to make a reasonable distinction.

Component list

This list contains the geometric data of all axes of the point selected in the point list. A component which has not yet been defined is characterized by --.--. The component list remains empty until a point has been selected in the point list. The list is overwritten with the associated point name.

Input field

New geometric values can be entered into this field. The field can also be moved to any component of a point by means of the cursor keys. The input field is only displayed after having selected an axis value in the component list.

Field index selection

The field index selection is only available after having selected a point field in the point list. For each field level a so-called index switch is displayed. Each index switch consists of an input field and two switch fields. In the input field, the desired index can directly be entered as a numerical value; the switch fields increment or decrement the index by one. In the heading of the array index selection, the dimension of the array is displayed. At the most, arrays with max. ten dimensions can be handled.


Activation and functions of Online

Close

By actuating this switch field, the point editor for this file is closed.

Transfer

By actuating this switch field, a point is transferred to the control. The switch field is only visible and can only be operated with the Online point editor.

 **All elements that can be used in the point editor dialog can also be selected directly by using the key combination <Alt> and the corresponding underlined letter.**

Selection of a kinematic

- Select the kinematic list with <Tab> or by pressing <Alt> + <K>. Select the desired kinematic with the cursor keys. The point list then shows all point names of the selected kinematics.

Selection of a point

- Select the point list with <Tab> or by pressing <Alt> + <P>. Mark the desired point with the cursor keys, the name of the point is displayed inverted. The component list shows all components of the selected point with numerical values.

Change of a point component

- Mark the point to be changed in the point list. Select the component list with <Tab> or by pressing <Alt> + <O>. The first component of the point is selected and the input field is displayed. Place the input field with the cursor keys onto the component to be changed and enter the new numerical value. The entry must be terminated with <Enter> or by moving the input field onto another component. The new value will only be taken over after having done so.

Change of an array index

- To enable the array index selection, a point array must have been selected from the point list. Select the index switch of the desired array level with <Tab> or by pressing <Alt> + <I>, the number in the input field is displayed inverted. Enter new index in the input field and terminate the entry by pressing <Enter>, new values will appear in the component array.


Termination of the point editor

- Select the switch field 'Close' with <Tab> or by pressing <Alt> + <C> and terminate the point editor by pressing <Enter>.

Activation and functions of Online

Send point to the control (only with Online)

- Select the switch field 'Transfer' with <Tab> or by pressing <Alt> + <T>. When pressing <Enter>, the currently selected point is transferred completely to the control, i. e. with all components, see point 3.2.5.

 **When terminating the point editor, Online asks in a dialog whether the editor should actually be closed. Through this inquiry it is ensured that Online is not terminated unintended. This dialog also permits cancelling the changes made before in the point file.**

Differences to the Online point editor

If desired, new point values can be monitored by software limit switches of a freely selectable machine parameter record. If a component exceeds these limits, the new component is not taken over and a corresponding error message will be displayed, see point 3.8.3. Belt values are not monitored.

3.2.5 Point Editor Online

When calling this menu point, a tool is activated that permits the editing of .pkt point files directly in the control. The operator is thus able to change geometric data of his movement program in a quick and easy way without having to edit and translate his qll file. Up to max. ten point files can be edited simultaneously, whereby each opened file is shown in a separate document window.

Call of the point editor Online

- from the main menu by <Alt> + <C> and then <N>
- from the pull-down menu by <N>

After having called the point editor, the operator must name the point file the geometric data of which he wants to change. The dialog for the determination of the files is also used at other places in Online and is explained in detail in chapter 8. The only difference is that only point files available in the control are offered for selection.

After having made the file selection, the document window of the actual point editor appears on the screen. The operation of the point editor is identical, except for the following differences for Offline and Online.

Activation and functions of Online


Differences to the Offline point editor

The Online point editor inserts new point values directly into the existing point file on the control. It is thus ensured that an active travel program can access the changed values immediately. After having left the Online point editor, it is no longer possible to cancel the changed values. The old values have been overwritten. The new point values are only transferred to the control and used there when activating the 'Transfer' switch field. With the Online point editor it is possible to edit points with up to 20 axis values.

 **If point values are changed and not sent to the control they will get lost when selecting another point.**

With the Online point editor, Kinematic names and component names are not the names from the qll- resp. point file, but the names as determined in the machine parameter program.

New point values are monitored in the control with the software limit switches activated there. If a component exceeds these limits, the new point will not be taken over and a corresponding error message will be displayed. This check cannot be switched off for safety reasons.

 **With the Online point editor, changed geometric data are directly inserted into the point file in the control. This means that an active travel program accesses also changed points immediately, changing at the same time the travel movement!**

3.2.6 Point to marker

This menu point contains an auxiliary tool for the point editor. With 'Point to Marker', the components of a selected point must be written into an intermediate storage. The further functions of the marker are described under item 3.8.2.

Writing a point into the marker

- from the main menu by <Alt> + <C> and then <P> or by <Shift> + <F2>
- from the pull-down menu by <P>

3.2.7 Marker to point

This menu point contains an auxiliary tool for the point editor. With 'Marker to Point', the components of a selected point are overwritten by the content of the intermediate storage. The further functions of the marker are described under item 3.8.2.

Activation and functions of Online

Occupation of a point with the values from the marker

- from the main menu by <Alt> + <C> and then <M> or by <Shift> + <F3>
- from the pull-down menu by <M>

3.2.8 Undo

Under this main menu point it is possible to undo changes in a point file that have been made with the point editor.

- from the main menu by <Alt> + <C> and then <U>
- from the pull-down menu by <U>
- with closed pull-down menu by <Ctrl> + <Z>

With the function 'Undo' always the last change in a point file is undone. Max. the last 20 actions can be cancelled.

Particularities with the Offline point editor

In this case, the undo function 'Undo' is made by components, i. e. each change in a point component can be undone. If a complete point is overwritten by the content of the marker, also the content of the whole point will be inserted again with the function 'Undo'.

Particularities with the Online point editor

In this case, the undo function 'Undo' only refers to complete points that have been sent to the control. A change by components and the overwriting of a point by the marker cannot be undone.

The function 'Undo' can only be selected if the active document window contains a point editor dialog (Offline or Online) and if at least one change has been made in the point file. Otherwise this menu point remains inaccessible.

3.2.9 MP to ASCII

By selecting this menu point, a conversion program is started by means of which a machine parameter file (.bin) is converted into a readable ASCII file (.amp). This ASCII file can then be edited and expanded with an ASCII editor, see machine parameter manual. The dialog for the determination of the machine parameter file is also used at other places in Online and is explained in detail in chapter 8.

 **A detailed description of the MP and XMP converter can be found in the manual 'rho4 Machine parameter Software manual', chapter 3.3.**

Activation and functions of Online

3.2.10 ASCII to MP

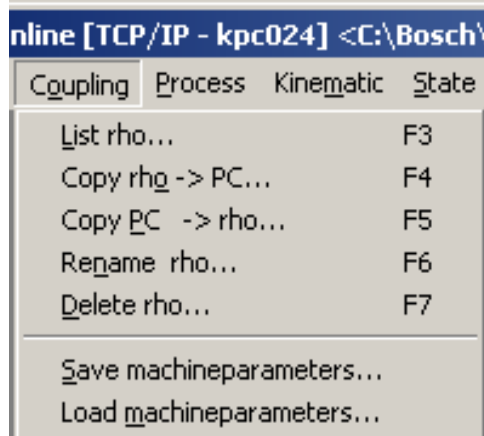
By selecting this menu point, a conversion program is started, by means of which an ASCII file with machine parameters (.amp) can be converted into a machine parameter file (.bin). This bin file can then be loaded into the control, see machine parameter manual. The dialog for the determination of the ASCII file is also used at other places in Online and explained in detail in chapter 8.

 **A detailed description of the MP and XMP converter can be found in the manual 'rho4 Machine parameter Software manual', chapter 3.3.**

Activation and functions of Online

3.3 Coupling

Under this main menu point auxiliary means can be called that permit the handling of files in the control. It is possible to create a list of files in the control, to exchange files between PC and control and to rename or delete files. Between PC and control only files with the extensions qll, err, pkt, ird, sym, dat, txt, bin, inc, bnr, tmp and dok can be transferred.



The texts F3 to F7 inform that these menu points can directly be selected with the function keys. With opened pull-down menu, the function keys are, however, inactive. For the activation of the individual pull-down menu points the same operation applies as to the main menu points. The pull-down menu can be closed by pressing <Esc>.

Possibilities for the selection of pull-down menu points

- Press the underlined letter of the desired menu point
- Mark the desired menu point with the cursor keys and activate it by pressing <Enter>

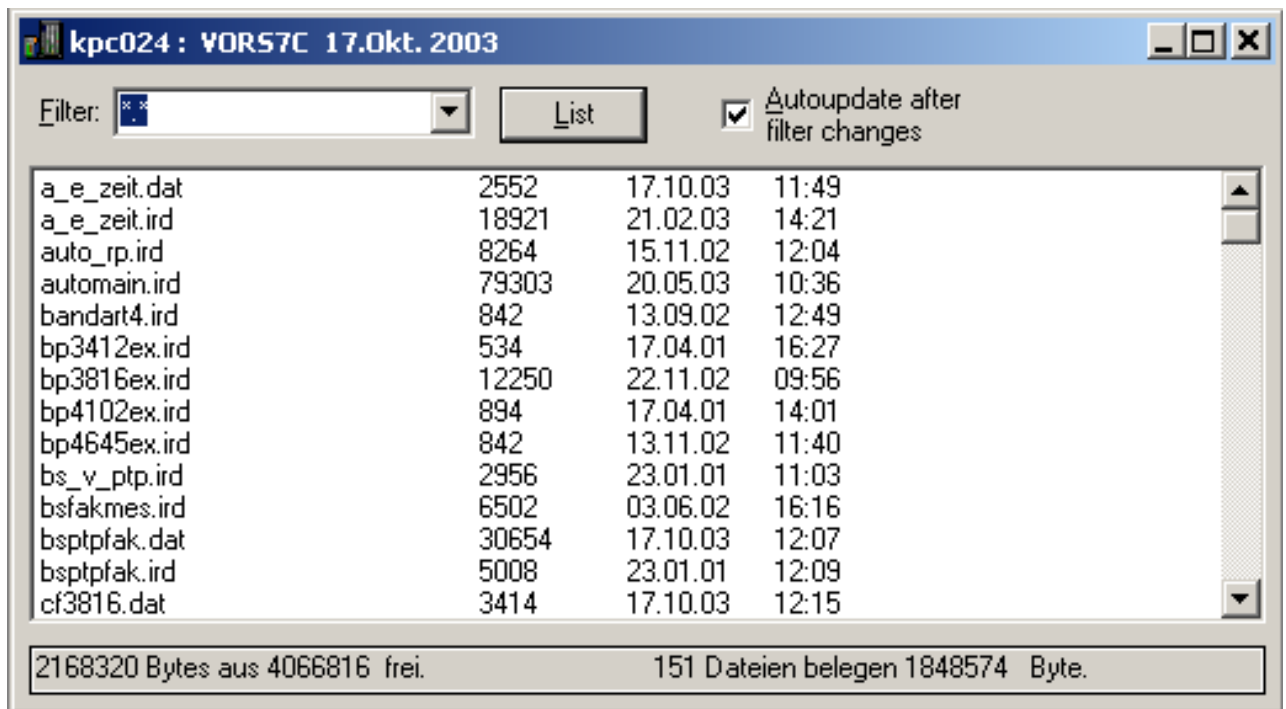
3.3.1 List rho4

When selecting this menu point, a document appears on the screen in which a list of all files existing in the control can be displayed. The window is empty at first. Only after having activated the switch field 'List', the list will be filled with the file names. In the title line of the document the current version of the control software will be displayed with its date of creation. A status line at the bottom of the window informs about the memory status and the number of files in the control.

Activation and functions of Online

Display of the files in the control

- From the main menu by <Alt> + <O> and then <L> or by <F3>
- From the pull-down menu by <L>. Select the switch field 'List' with <Tab> and display the list with the currently available files by pressing <Enter>.



Filename	Size	Date	Time
a_e_zeit.dat	2552	17.10.03	11:49
a_e_zeit.ird	18921	21.02.03	14:21
auto_rp.ird	8264	15.11.02	12:04
automain.ird	79303	20.05.03	10:36
bandart4.ird	842	13.09.02	12:49
bp3412ex.ird	534	17.04.01	16:27
bp3816ex.ird	12250	22.11.02	09:56
bp4102ex.ird	894	17.04.01	14:01
bp4645ex.ird	842	13.11.02	11:40
bs_v_ptp.ird	2956	23.01.01	11:03
bsfakmes.ird	6502	03.06.02	16:16
bsptfak.dat	30654	17.10.03	12:07
bsptfak.ird	5008	23.01.01	12:09
cf3816.dat	3414	17.10.03	12:15

2168320 Bytes aus 4066816 frei. 151 Dateien belegen 1848574 Byte.

☞ **Owing to the data block size of 512 bytes, every file occupies at least 512 bytes of user memory even if its size is only a few bytes. That is why in the case of many small files there are great differences between occupied and free memory.**

The illustration shows a list of all files (*.*) in the control. The file list is shown in a document window and can be displayed simultaneously with other document windows, e. g. basic information. This window can be placed anywhere on the screen, can be changed in size and can also be reduced to a symbol, see point 3.11.1.

Activation and functions of Online

Control elements of the rho4 list


File list	This list displays all files in the control. It is also possible to mark files to be transferred to the PC, to be renamed or deleted in the control
Select	In this input field, the operator can make a pre-selection of files to be contained in the file list. The entry *.* provides e. g. a list of all files, whereas the entry *.qll lists qll files only. The last filter selection remains to the next opening of the rho4 list window.
List	When activating this control element, the file list is created or updated.
Autoupdate after filter changes	Via this checkbox the updating of the rho4 file list can be automated. If the checkbox is marked, the rho4 list is being updated if a new filter is selected. If the file filter is edited, no update takes place

Display specific files

- Activate the list selection with <Tab>. When doing so, the current content is displayed inverted. Display the desired filter with the cursor keys. The file list is only updated by activating the switch field 'Liste' or by pressing <Enter>.

Mark files to be transferred to the control, to be renamed or to be deleted

- File names appear in the list one after the other. Select the file list with <Tab>. The first file name in the list is displayed inverted or framed. Mark the first file name to be transferred with the cursor keys. A whole group of files can be marked by pressing the <Shift> key additionally.
- The file names in the list are scattered. Select the file list with <Tab>. The first file name in the list is displayed inverted or framed. By pressing <Shift> + <F8> (simultaneously) a switch-over is made that permits an individual selection. A flashing frame with broken lines can be seen. Move the frame with the cursor keys onto the desired file names and mark them with the <Space> bar (name is inverted). By repeating this procedure it is also possible to undo the marking.

 **The actual copying procedure is started by pressing <F4>. When renaming or deleting files in the control, only one file should be marked in the file list.**

Closing of the document windows

- with <Alt> + <F> and then <C> or
- by <Ctrl> + <F4>

Activation and functions of Online

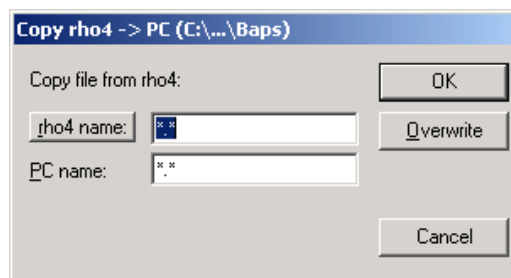
3.3.2 Copy rho4 -> PC

The function of this pull-down menu point is to copy files from the control into the PC.

Copy files from the control into the PC

- from the main menu by <Alt> + <O> and then <O> or by <F4>
- from the pull-down menu by <O>

After activation, the operator can name the file to be copied in the following dialog:



The name of the file to be transferred is typed into the input field 'rho4 name'. In doing so, the PC name follows automatically, but it can be changed afterwards. This makes it possible to copy and rename simultaneously.


The length of the file name must not exceed eight characters. The file extension must fit. Possible file extensions are mentioned in section 3.3. The switch fields 'OK' and 'Overwrite' are only active when both conditions have been met.

When starting the copying procedure by acknowledging 'OK', Online will check whether a file with the same name already exists. In this case the action will be aborted and a corresponding error message will be displayed.

When copying with 'Overwrite' an already existing file will be overwritten with the same name.

The switch field 'Cancel' aborts the process without having copied the file.

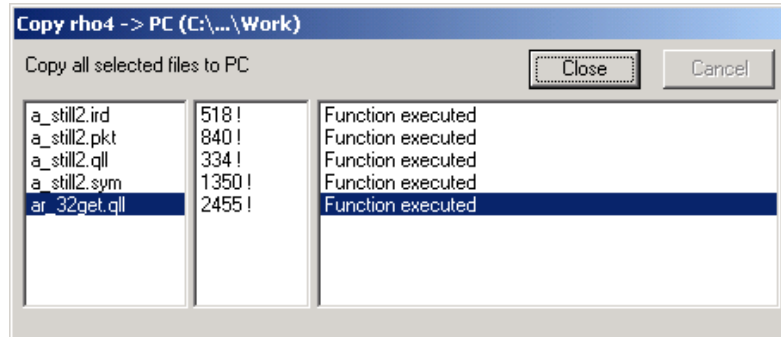
For the selection of the file name in the control, a dialog can be opened by means of the switch field 'rho4 name'. This dialog for the determination of files is also used at other places in Online and is explained in detail in chapter 8.

 **If no path is indicated with the name of the target file (file name on the PC), the path will be assumed which is shown in the title line of the copying dialog. In the above illustration, the path would be c:\Bosch\rho4\Example\Baps.**

Activation and functions of Online

Handling of the dialog

- With <Tab> it is possible to change between the input fields and the switch fields
- <Enter> executes the action of the selected switch field



The first column contains the names of the files being copied. The second column shows the file length. It is counted down during the copying process, showing the complete size of the file after termination of the process. The third column indicates the correct execution of the action, possible error messages or an abort.

 **This window must be closed for Online to permit further actions.**

- Close the window by pressing <Enter> or <Esc>

Abort storage of programs

- Select the switch field 'Cancel' with <Tab> and abort the storage by pressing <Enter>

3.3.3 Copy PC -> rho4

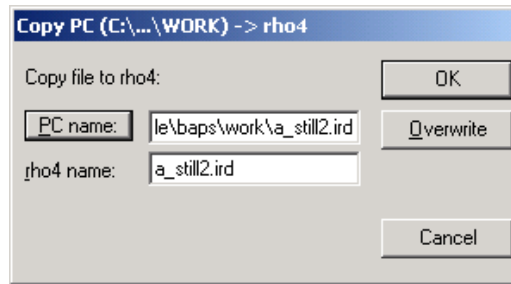
The function of this pull-down menu point is to copy files from the PC to the control.

Copy from the PC to the control

- from the main menu by <Alt> + <O> and then <P> or by <F5>
- from the pull-down menu by <P>

Activation and functions of Online

After activation, the operator can name the file to be copied in the following dialog:



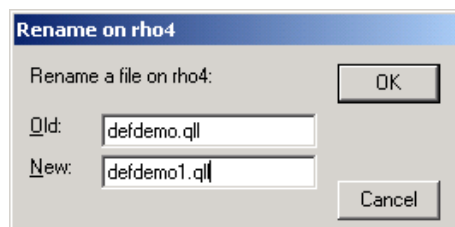
Sequence and handling of this copying procedure are the same as the procedure described before, yet in opposite order, see point 3.3.2. Only for the entry of the PC name it is possible to open a further dialog here which facilitates the selection of the file name on the PC. This dialog for the determination of files is also used at other places in Online and is described in detail in chapter 8.

3.3.4 Rename rho4

With this menu point it is possible to rename files in the control.

Rename a file in the control

- from the main menu by <Alt> + <O> and then <N> or by <F6>
- from the pull-down menu by <N>




In this example, the file defdemo.qll is to be renamed into defdemo1.qll. By activating the switch field 'OK' the file in the control will be given the new name, by activating the switch field 'Cancel' the file keeps its current name and the dialog disappears from the screen.

The switch field 'OK' can only be activated, if a name is entered in both input fields, 'Old' and 'New'. The name of the file to be renamed can be pre-set in the document window 'rho4-List', see point 3.3.1.

Rename a file in the control

Select the input field 'Old' with <Tab> or by <Alt> + <O> and enter the name of the file to be renamed. Then select the input field 'New' with <Tab> or by <Alt> + <N>. Activate the switch field 'OK' with <Tab> and start the rename procedure by pressing <Enter>.

Activation and functions of Online

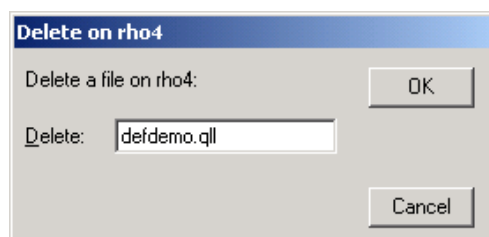
-  **A renaming is only possible when the old and the new file names have the same file extension.**

3.3.5 Delete rho4

Files can be deleted in the control by selecting this menu point.

Delete a file in the control

- from the main menu by <Alt> + <O> and then <D> or by <F7>
- from the pull-down menu by <D>



In this example the file defdemo.qll is to be deleted. By activating the switch field 'OK' the file is deleted in the control. By activating the switch field 'Cancel' the file is maintained and the dialog disappears from the screen.

The switch field 'OK' can only be activated when a name is entered in the input field 'Delete'. The name of the file to be deleted can be pre-set in the document window 'rho4-List', see point 3.3.1.

Delete a file in the control

- Select the input field 'Delete' with <Tab> or by <Alt> + <D> and enter the file name of the file to be deleted. Activate the switch field 'OK' with <Tab> and start the deletion by pressing <Enter>.

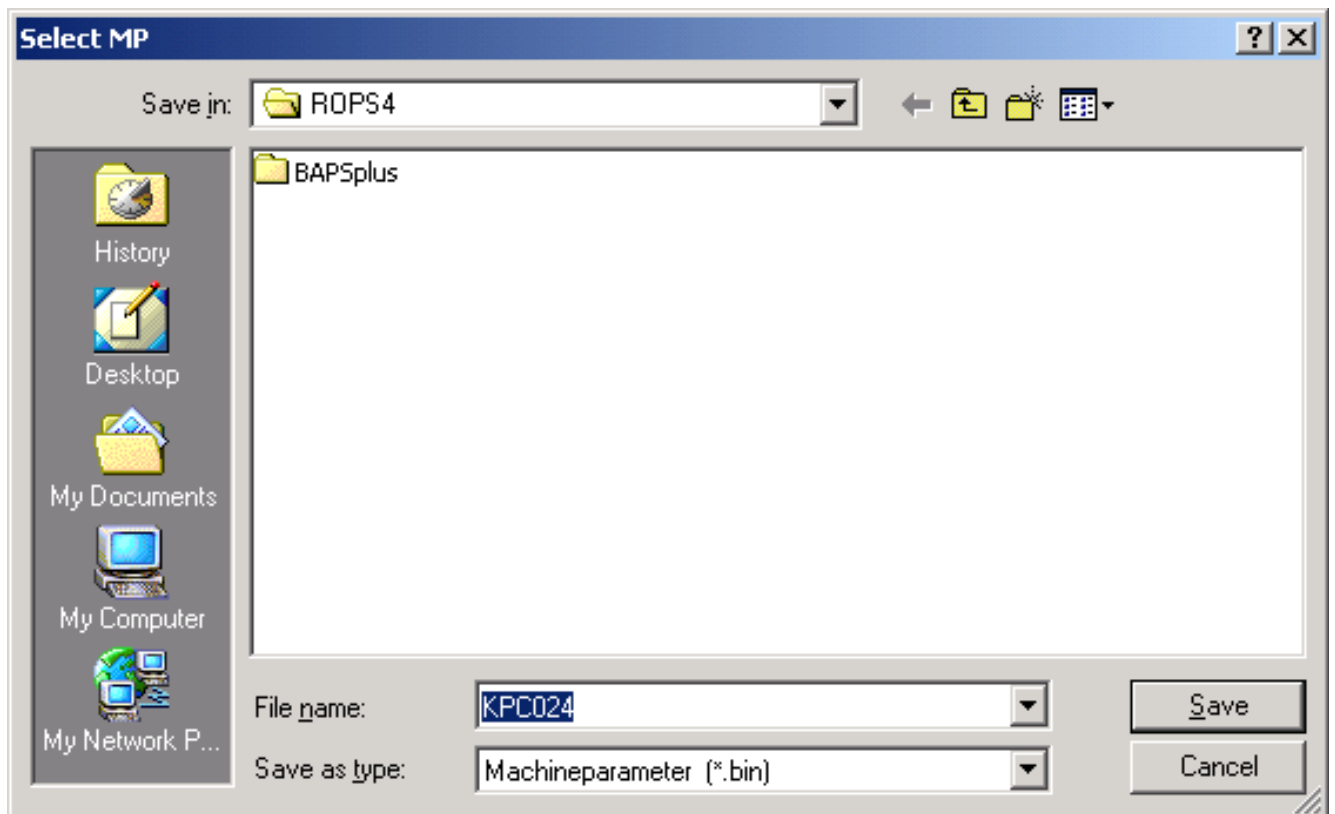
3.3.6 Save machineparameters

The machine parameter file can be saved from the control to a PC by selecting this menu point.

Save machine parameters

- from the main menu by <Alt> + <O> and then <S>
- from the pull-down menu by <S>

Activation and functions of Online



The default filename of the MPP file to save consists of the alias name of the control (in this case kpc024) and the file extension "bin". The default directory is the actual WorkingDir.

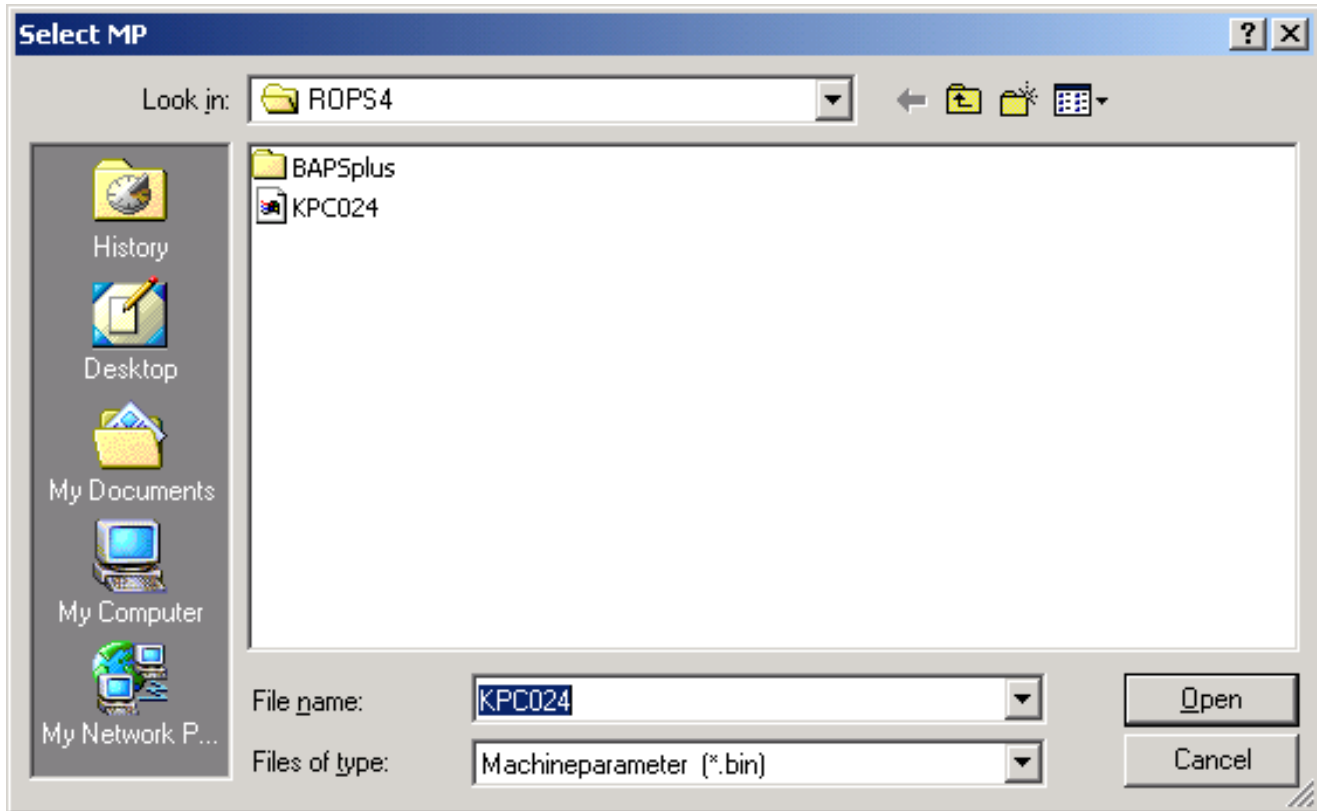
3.3.7 Load machineparameters

The machine parameter file can be load from the PC in the control by selecting this menu point.

Load machine parameters

- from the main menu by <Alt> + <O> and then <M>
- from the pull-down menu by <M>

Activation and functions of Online

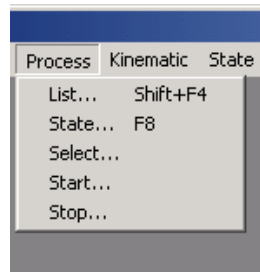


The default directory is the actual WorkingDir. Long filenames are supported.

Activation and functions of Online

3.4 Process

This main menu point contains a number of tools which inform the operator on the status of processes in the control and by means of which the control processes can be influenced.



Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor, keep it pressed and activate it by pressing <Enter>

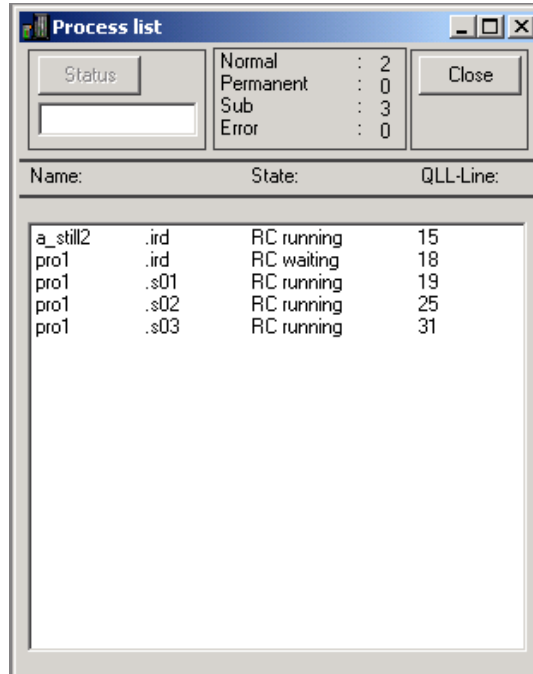
3.4.1 List

This pull-down menu point supplies a list of all processes currently active in the control. This list shows the names of the processes, their statuses and the current qll line number. Additional information on a specific process can be displayed by entering the process names in the input field under the switch field 'State' and by actuating this switch field, see point 3.4.2. When activating the switch field 'Close', the display dialog will be closed. The display of the list is updated permanently.

Activation and functions of Online

Activate the process list

- from the main menu by <Alt> + <P> and then <L> or by <Shift> + <F4>
- from the pull-down menu by <L>



In this example of a process list, two normal processes (a_still2 and pro1) are active in the control. The three active sub-processes (pro1.s01 to pro1.s03) indicate that the process pro1 is in a parallel instruction with three branches.

Display additional information on a specific process

- Select the input field under the switch field 'State' with <Tab>, enter the process name and display additional information by activating the switch field 'State'
- Select the list with the process name with <Tab>. Mark the desired process name with the cursor keys (the name appears in the input field) and display additional information by activating the switch field 'State'

Switching-over between several document windows

- <Ctrl> + <F6>

Close the process list

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and close it by pressing <Enter>

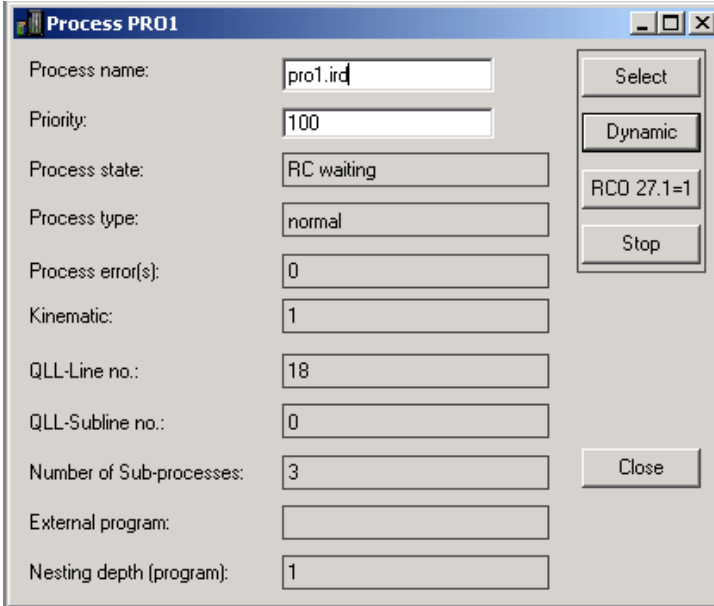
Activation and functions of Online

3.4.2 State

The selection of this pull-down menu point supplies information such as type of process, process error, kinematics, qll line numbers etc. via a specific process being active in the control. The display is static when being called and also supplies the process state at the moment of the call. By activating the switch field 'Dynamic' the display is updated permanently.

Activation of the status display

- From the main menu by <Alt> + <P> and then <S> or by <F8>
- From the pull-down menu by <S>



The screenshot shows a dialog box titled "Process PRO1" with the following fields and buttons:

Process name:	pro1.ird	Select
Priority:	100	Dynamic
Process state:	RC waiting	RCO 27.1=1
Process type:	normal	Stop
Process error(s):	0	
Kinematic:	1	
QLL-Line no.:	18	
QLL-Subline no.:	0	
Number of Sub-processes:	3	Close
External program:		
Nesting depth (program):	1	

The illustration shows the process state information of the process pro1.

 **The process name has to be entered with the file extension .ird, otherwise the entry will be invalid.**

Activation and functions of Online

Elements of the status display

Process name	Input field for the name of the process the state of which is to be displayed
Priority	Input field for the process priority. This value is only important if several processes are active simultaneously. When changing this numerical value, more or less computer time can be allocated to a process. Priority 100 is displayed inverted; the adjustable values range from 100 to 150.
Process state	A process can take four different states (RC waits, RC ready, RC stops, RC runs).
Process type	There are normal processes (processes with travel instructions) and permanent processes (processes without movement)
Process error(s)	Error caused by the process
Kinematic	Number of the kinematics that can be influenced by the process
QLL–line no.	Line number of the currently active instruction line
QLL–sub line	Line number of the currently active instruction line in an include file
Number of sub-processes	Number of the active parallel branches of a process
External program	Name of a currently active external main program
Nesting depth (program)	Level depth in external main programs

Switch fields of the status display

Select	By actuating this switch field, the process is selected in the control, the name of which is indicated in the input field 'Process name'
Dynamic, Halt	Call of the current state resp. change-over from static to dynamic display
RCO 27.1=1	Setting the RC output 27.1, process start via the programming unit. The output is automatically reset after 200 ms. See signal description manual.
Stop	Stop of a process in the control
Close	Closing a display for the process state

Display the state of a process

- Select the input field for the process name with <Tab> and enter the name

Activation and functions of Online

- Select the switch field 'State' with <Tab> and have state displayed by pressing <Enter>

Switching-over between several document windows

- <Ctrl> + <F6>

Closing of the state display

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and close it by pressing <Enter>

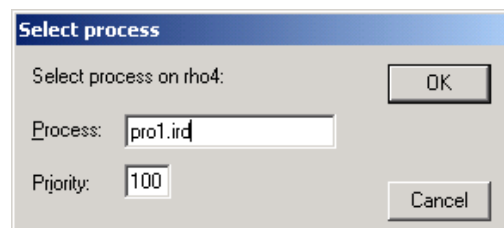
3.4.3 Select

A process in the control can be selected by selecting this pull-down menu point.


Activation of the process selection

- from the main menu by <Alt> + <P> and then <E>
- from the pull-down menu by <E>

The name of the process is determined by the following dialog:



The process name must be entered in the input field 'Process:'. In the illustration, the process pro1.ird is selected. By entering a value in the input field 'Priority:' the allocation of computing time for the process can be changed. Valid are values in the range from 100 to 150, whereby 100 is the max. computing time allocation. Selecting a process does not mean that the process is started simultaneously. This will only be done by setting the RC input 'Program start'.

 **The window must be closed by pressing <Esc> to be able to continue working with Online. The process name must be entered with the file extension .ird, otherwise the entry will be invalid.**

Selection of a process

- Select the input field 'Process:' for the process name with <Tab> and enter the name
- Select the switch field 'OK' with <Tab> and acknowledge the selection by pressing <Enter>

Activation and functions of Online

Abort of a selection

- With <Esc> the window is closed again
- Select the switch field 'Cancel' with <Tab> and abort the selection by pressing <Enter>

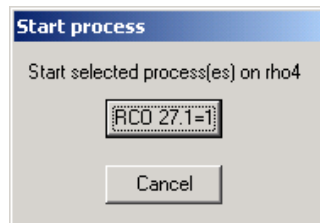
3.4.4 Start

With this pull-down menu point all selected processes in the control can be started.

Activation of process start

- from the main menu by <Alt> + <P> and then <T>
- from the pull-down menu by <T>

The start itself is activated or aborted by the following dialog:



Processes can only be started indirectly from the ROPS4. Since the PC has no direct access to digital inputs (and can thus neither influence the start cycle), the RC output 27.1 is set to 1 when activating the switch field 'RCA 27.1=1' and reset automatically to 0 after 200 ms. The 200ms waiting time is necessary to enable the RC to react to the signal change. The time, in which the RC output 27.1 takes the state 1, can be adjusted via an entry in the INI file (ROPS4WIN.INI), see chapter 7 'The file ROPS4WIN.INI'.

To enable the cycle start, the user must copy the RC output 27.1, process start via PG, from his PLC program to the digital input 'cycle start'.

Start process

- Select the switch field RCO 27.1=1 with <Tab> and enable the process start by pressing <Enter>

No process is started by activating the switch field 'Cancel' or by pressing <Esc> and the dialog is deleted.

Activation and functions of Online

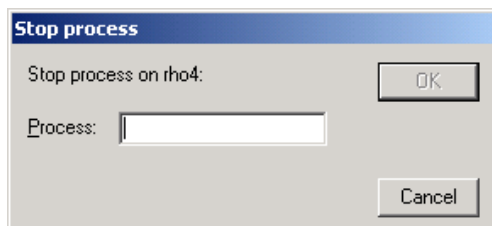
3.4.5 Stop

With this pull-down menu point all selected processes in the control can be stopped.

Activation of the process stop

- from the main menu by <Alt> + <P> and then <O>
- from the pull-down menu by <O>

The process to be stopped is inquired by the following dialog:




The process name with of the file extension .ird has to be entered into the input field. The process is stopped by activating the switch field 'OK'. The dialog is then deleted from the screen.

Stop process

- Select the input field with <Tab> and enter the name of the process into the input field
- Select the switch field 'OK' with <Tab> and stop the process by pressing <Enter>

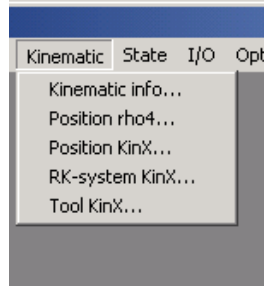
The process is not stopped by activating the switch field 'Cancel' or by pressing <Esc> and the dialog disappears.

 **The switch field 'OK' can only be activated when a valid process name is entered in the input field.**

Activation and functions of Online

3.5 Kinematic

Monitoring tools are contained under the main menu point 'Kinematic'. They supply information on positions, programmed destination points and lags, as well as a dynamic display of world and tool coordinate systems that can be freely defined. A further menu point informs about the kinematics connected to the control.



The individual pull-down menu points are activated in the same way as the main menu points. The pull-down menu can be closed again by <Esc>.

Possibilities for the selection of pull-down menu points

- Actuate the underlined letter of the desired menu point
- Mark the desired menu point with the cursor keys and activate it by pressing <Enter>

3.5.1 Kinematic info

When selecting this pull-down menu point, a document window is opened that informs about all kinematics connected to the control.

Activation of the kinematic info

- from the main menu by <Alt> + <M> and then <M>
- from the pull-down menu by <M>

No.	Name	Axes	Belts	referenced
1	ROBL_1	1 -- 2	5 -- 5	***
2	ROBL_2	3 -- 4	6 -- 6	***

Activation and functions of Online

The illustration above supplies kinematics informations of a control with two kinematics. The kinematics are called ROBI_1 and ROBI_2 and have two axes. Both kinematics have a belt. All axis have approached their reference point which is indicated by the asterisk in the column 'referenced'. The asterisk are missing in the display if the axes have not been referenced.

Closing of the kinematic info

- With <Esc> or <Enter> the window is closed again

3.5.2 Position rho4

When selecting this pull-down menu point a document window is opened that informs about all axes connected to the control. The information contains the current position, the programmed end point (only in automatic mode) and the lag of the individual axes. The display of all axes and belt data is continually updated.

Activation of the display for axes information

- from the main menu by <Alt> + <M> and then <P>
- from the pull-down menu by <P>

Selection elements for the coordinate system

Axis name	Position	Endp.(prog)	Inpos	Lag
K01.X_A*	- 395.38	- 395.38	*	0.000
K01.Y_A*	314.13	314.13	*	0.000
K02.A_3*	0.00	0.00	*	0.000
K02.A_4*	0.00	0.00	*	0.000

Belt name	Position
K01.BN1	0.00
K02.BN2	0.00

Activation and functions of Online

The illustration above supplies axis information about a rho4 with two kinematics, K01 and K02, with two axes. The kinematic names are determined by ROPS4. The axes names are names which are entered in the machine parameter set of the control. All axes are in position, indicated by the asterisk in the column 'Inpos'. For both kinematics a belt is applied.

12 axes and 3 belts can max. be displayed simultaneously. If in a control more axes or belts are available, additional control elements appear in the dialog above which enable a selection of the max. number of axes or belts that can be displayed.

Elements of the axis position display

List with axis coordinates	In this list, the number values of axis position, end point and lag are displayed. A asterisk indicates whether the respective axis is in position.
List with belt coordinates	In this list, the number values for belt positions are displayed.
Selection elements for the coordinate system	<p>It is possible to determine with these selection elements in which coordinate system the axis resp. belt values are to be displayed. Only one selection element can be active at a time which is indicated by the point in the circle.</p> <p>The selection elements have the following meaning</p> <p>active All axes values are displayed in the coordinate system preset by the control, i.e. the system in which the axes are currently moved</p> <p>JC display in machine coordinates</p> <p>WC display in world coordinates</p>

Selection of another coordinate system

- Activate the first selection element with <Tab>, the circle and the text are displayed in a frame. Then select the desired coordinate system with the cursor keys.

Closing of the axis info

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and terminate the display with <Enter>

Activation and functions of Online

3.5.3 Position KinX

By selecting this pull-down menu point, a document window is opened which informs about all axes of a kinematic. The information contains the current position, the programmed end point (only in automatic mode) and the lag of the individual axes. The display of all axes and belt data is continually updated.

Activation of the axis information display

- from the main menu by <Alt> + <M> and then <X>
- from the pull-down menu by <X>

Kinematic Selection elements for the
selection coordinate system

Axes name	Position	Endp.(prog)	Inpos	Lag
X_A *	- 395.38	- 395.38	*	0.000
Y_A *	314.13	314.13	*	0.000

Belt name	Position
BN1	0.00

In the illustration above, axis information of the 1st kinematic, ROBI_1, is displayed. The kinematic has two axes and a belt. All axes are in position which is indicated by the asterisk in the column 'Inpos'.

Activation and functions of Online

Elements of the axis-position-display of a kinematic

Kinematic selection	Here it is possible to select for which kinematic the axis positions are to be displayed.
List with axis coordinates	In this list, the number values of axis position, end point and lag are displayed. A asterisk indicates whether the respective axis is in position.
List with belt coordinates	In this list, the number values for belt positions are displayed.
Selection elements for the coordinate system	<p>It is possible to determine with these selection elements in which coordinate system the axis resp. belt values are to be displayed. Only one selection element can be active at a time which is indicated by the point in the circle.</p> <p>The selection elements have the following meaning</p> <p>active All axes values are displayed in the coordinate system preset by the control, i.e. the system in which the axes are currently moved</p> <p>OC display in original coord. system *</p> <p>JC display in machine coordinates</p> <p>WC display in world coordinates</p>

* only visible, when Option-Bit for 'WC_System' is set

Selection of a kinematic

- Activate with <Tab> the selection element, the name of the kinematic is displayed inverted. Then select the name of the desired kinematic with the cursor keys. The display of the axis resp. belt positions is automatically updated

Selection of another coordinate system

- Activate with <Tab> the first selection element, the circle and the text are displayed in a frame. Then select the desired coordinate system with the cursor keys

Closing of the axis info for kinematics


- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and terminate the display with <Enter>

Activation and functions of Online

3.5.4 WC system KinX

In the control of the rho4, it is possible to define any world coordinate system for oneself. So a BAPS processing program with fix programmed points can quickly be adapted to the real position of the workpiece. The currently valid world coordinate system is communicated to the control by a kinematic-related standard variable, called WC_SYSTEM.

Under the menu point 'WC-System KinX' the currently valid world coordinate system of a kinematic can be monitored. The display is updated permanently.

 **If the Option-Bit for WC_System is not set, an error message will be displayed when this menu item is selected**

Activation of the display of the valid coordinate system

- from the main menu by <Alt> + <M> and then <R>
- from the pull-down menu by <R>



If no world coordinate system is active, the text "RKur aktiv" is displayed; otherwise the name of the currently active world coordinate system is displayed. Below this text the coordinate values of the currently active world coordinate system of the selected kinematics is displayed. The kinematics can be selected by the selection element 'Kinematic'

Selection of the kinematic

- Activate with <Tab> the selection element 'Kinematic'. The name of the kinematic is then inverted. Select with the cursor keys the name of the desired kinematic

Closing of the display of the world coordinate system

- With <Esc> the window is closed again

Activation and functions of Online

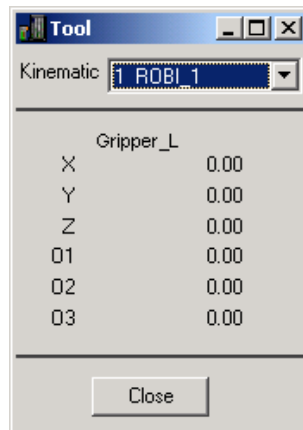
- Select the switch field 'Close' with <Tab> and terminate the display with <Enter>

3.5.5 Tool KinX

When using the individual tools of a kinematic, the transformation of the coordinates and the transformation of world coordinates into the corresponding machine movement have to be taken into account. The control of the rho4 offers the possibility of defining tool coordinate systems referring to the tool flange of the corresponding kinematic. Via the menu point 'Tool KinX' these coordinate systems can be monitored. The display is updated permanently.

Activation of the display of the tool coordinate system

- from the main menu by <Alt> + <M> and then <T>
- from the pull-down menu by <T>



In the illustration, the coordinate system of the currently active tool Gripper_L of the kinematic ROBI_1 is displayed. By the selection element 'Kinematic' the kinematic, the valid world coordinate system of which is to be displayed, can be selected

Selection of the kinematic

- Activate with <Tab> the selection element 'Kinematic'. The name of the kinematic is then inverted. Select with the cursor keys the name of the desired kinematic

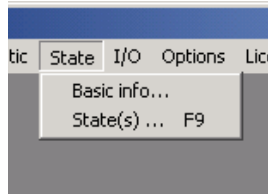
Closing of the display of the tool coordinate system

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and terminate display with <Enter>

Activation and functions of Online

3.6 State

Under this menu point, information and error messages of the connected control can be inquired.

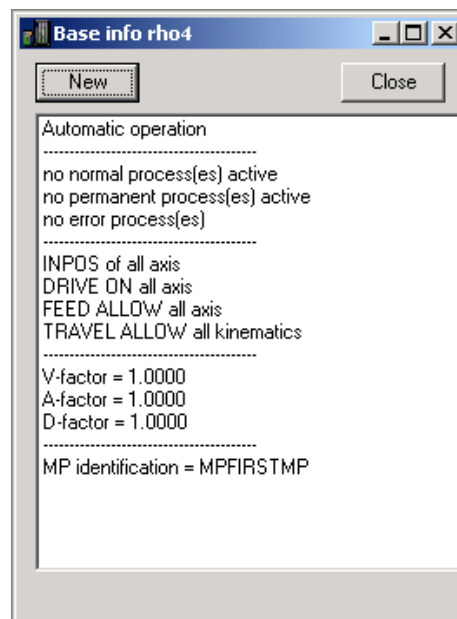


Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor by pressing <Enter>

3.6.1 Basic info

When selecting this pull-down menu point, various pieces of information on the control are displayed in a document window the user. With the switch field 'New', the display can be updated.



Activation of the basic information

- from the main menu by <Alt> + <S> and then
- from the pull-down menu by

Closing of the basic information

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and confirm it with <Enter>

Activation and functions of Online

Update display

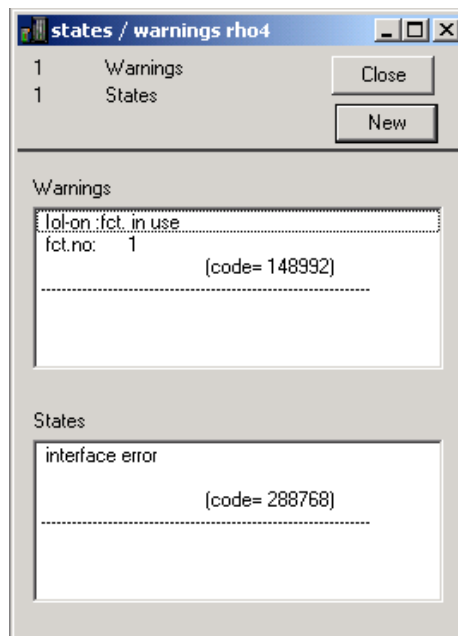
- Select the switch field 'New' with <Tab> and confirm it with <Enter>

Switching-over between several document windows

- <Ctrl> + <F6>

3.6.2 State(s)

When selecting this pull-down menu point, a list of the currently active state messages and warnings in the control is displayed to the operator. The display is updated automatically if the number of states or warnings have changed, but only, if a dynamic display (e.g. process list) is active. The display can be manually updated with the switch field 'New'.



Activation of the state display

- from the main menu by <Alt> + <S> and then <S> or by <F9>
- from the pull-down menu by <S>

Closing of the state display

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and confirm it with <Enter>

Update display

- Select the switch field 'New' with <Tab> and confirm it with <Enter>

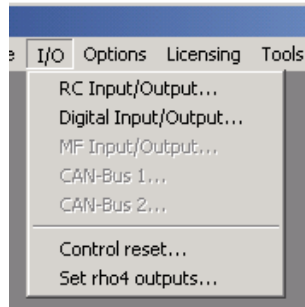
Switching-over between several document windows

- <Ctrl> + <F6>

Activation and functions of Online

3.7 I/O

Under this menu item it is possible to display the status of several inputs and outputs, to enable the initial position in the control and to set particular RC outputs specifically. The display is updated permanently.



Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor and activate it with <Enter>

3.7.1 RC Input/Output

This menu point serves the activation of an additional tool which can be very helpful for monitoring the sequence program and localizing errors. RC input/output bytes can be displayed in a document window at will. The display is updated permanently.

Inputs									
	7	6	5	4	3	2	1	0	dec/hex
16	1	1	1	0	0	0	0	1	225/e1
17	0	0	0	0	0	0	0	1	1/1
18	0	0	0	0	0	0	0	0	0/0
19	0	0	0	0	0	0	0	0	0/0
20	0	0	0	0	0	0	0	0	0/0
21	0	0	0	0	0	0	0	0	0/0

Outputs									
	7	6	5	4	3	2	1	0	dec/hex
16	0	0	0	0	0	0	0	1	1/1
17	0	0	0	0	0	0	1	0	2/2
18	0	0	0	0	1	0	0	0	8/8
19	0	0	0	0	1	0	0	1	9/9
20	1	0	0	0	0	0	0	0	128/80
21	1	0	0	0	0	0	0	0	128/80
22	0	0	0	1	0	1	1	1	23/17

Inputs Outputs Close

Activation and functions of Online

In the illustration, the RC input bytes 16 to 22 and the RC output bytes 16 to 22 are displayed. The selection of bytes to be displayed can be made by the operator after having activated the switch field 'Inputs' resp. 'Outputs', see point 3.7.3.

For the display of more than ten bytes it is possible to scroll the inputs or outputs in the display lists.

Activation of the display

- from the main menu by <Alt> + <I> and then <R>
- from the pull-down menu by <R>

Closing of the display

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and confirm it with <Enter>

Selection of the input/output bytes

- Select the switch field 'Inputs' resp. 'Outputs' with <Tab> and confirm it with <Enter>

Scrolling in the display list

- Select the display list for inputs resp. outputs with <Tab> and scroll with the cursor keys

Switching-over between several document windows

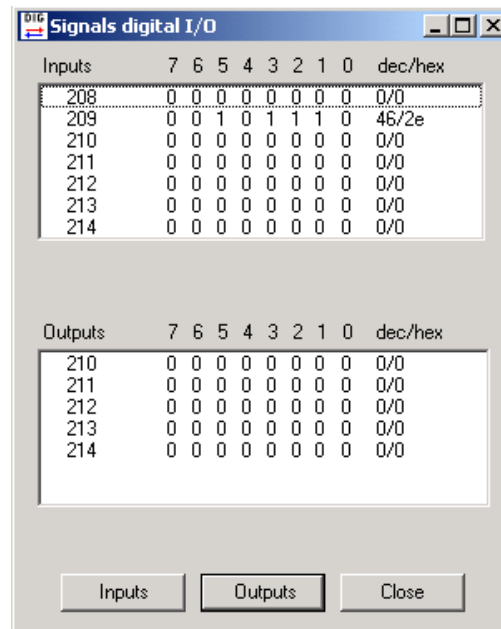
- <Ctrl> + <F6>

The number of RC inputs/outputs and of digital inputs/outputs is limited to 47. A document window with RC inputs/outputs can only be opened once.

Activation and functions of Online

3.7.2 Digital Input/Output

This menu point serves the activation of an additional tool which can be very helpful for monitoring the sequence program and localizing errors. Any digital input/output bytes can be displayed in a document window. The display is updated permanently.



In the illustration, the digital input bytes 208 to 214 and the digital output bytes 210 to 214 are displayed. The selection of bytes to be displayed can be made by the operator after having activated the switch field 'Inputs' resp. 'Outputs', see point 3.7.3.

For the display of more than ten bytes it is possible to scroll the inputs or outputs in the display lists.

Activation of the display

- from the main menu by <Alt> + <I> and then <D>
- from the pull-down menu by <D>

Closing of the display

- With <Esc> the window is closed again
- Select the switch field 'Close' with <Tab> and confirm it with <Enter>

Selection of the input/output bytes

- Select the switch field 'Inputs' resp. 'Outputs' with <Tab> and confirm it with <Enter>

Scrolling in the display list

- Select the display list for inputs resp. outputs with <Tab> and scroll with the cursor keys

Activation and functions of Online

Switching-over between several document windows

- <Ctrl> + <F6>

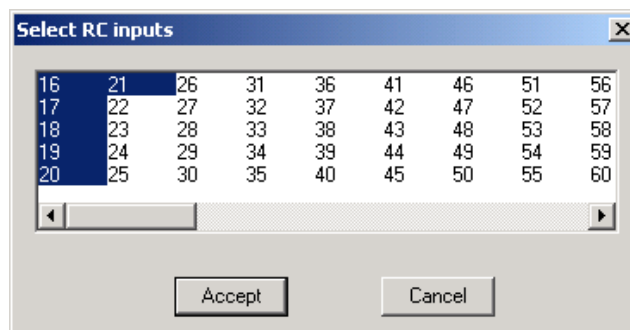
The number of RC inputs/outputs and of digital inputs/outputs is limited to 47. A document window with RC inputs/outputs can only be opened once.

3.7.3 Selection of RC and digital inputs/outputs

When activating the switch field 'Inputs' resp. 'Outputs' in the document windows for RC and digital inputs/outputs, a dialog window appears on the screen in which the operator can mark the desired bytes to be displayed. The display is updated permanently.

The dialog windows for the byte selection only differ in the title line and the number of bytes for the selection. Their handling is one and the same.

Example of a selection dialog



The bytes to be displayed are displayed inverted after their selection, in the illustration, bytes 16 to 21. After having terminated the selection of bytes by activating the switch field 'Accept', the dialog disappears and the dialog window then shows the newly defined bytes.

By activating the switch field 'Cancel', the new selection is cancelled, the bytes selected before are displayed again.

Activation of the dialog for the selection of bytes

- Select the switch field 'Inputs' resp. 'Outputs' with <Tab> and start by pressing <Enter>

Selection of individual and contiguous bytes

- Select the desired byte number with the cursor keys, the number is displayed inverted. When additionally pressing the <Shift> key, a whole contiguous group of bytes can be marked. After having made the selection with <Tab>, select the switch field 'Accept' and acknowledge the selection by pressing <Enter>.

Activation and functions of Online

Selection of individual and not contiguous bytes

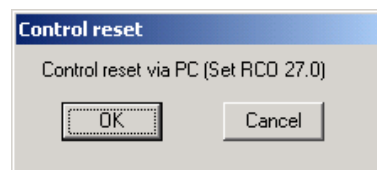
- <Shift> + <F8> permits a changing-over and thus the selection of several, not contiguous bytes. The selected byte framed in broken lines flashes. Select the desired byte number with the cursor keys and acknowledge the selection by pressing the <Space> bar. After having made the selection with <Tab>, select the switch field 'Accept' and acknowledge the selection by pressing <Enter>.

Abort of a selection procedure

- Select the switch field 'Cancel' with <Tab> and acknowledge the selection by pressing <Enter>. The newly selected bytes are cancelled.

3.7.4 Initial position

By selecting this menu point, the operator of the PC can set the RC output 'Control Reset via PC'. The signal is reset by the RC after having terminated the initial position logic. Setting this signal has no immediate influence in the control. If required, the user has to copy this signal in his PLC program to the RC inputs and thus enable the desired responses in the control, e. g. copy the signal 'Control Reset via PC', RC output 27.0, to 'Initial position of RC', RC input 16.2.



By activating the switch field 'OK', the signal 'Control Reset via PC' is set. With 'Cancel' the dialog disappears without having set the signal.

☞ The signal 'Control Reset via PC' must not be confused with the RC input 'Initial position of RC'.

Activation of Control Reset

- from the main menu by <Alt> + <I> and then <C>
- from the pull-down menu by <C>

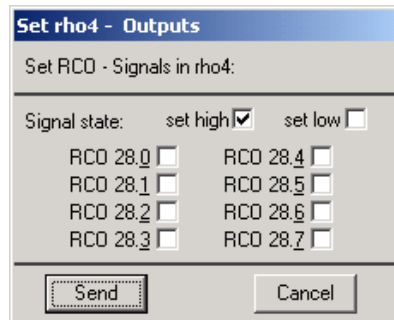
Set 'Control Reset via PC'

- With switch field 'OK'

Activation and functions of Online

3.7.5 Set rho4 outputs

By selecting this menu point, the operator of the PC can influence eight RC outputs at will. This concerns the RC outputs 28.0 to 28.7. These outputs have no direct influence on the RC. In case of links in the PLC program the user can, however, enable the desired responses.



A selection menu is available for each of the eight RC outputs. This selection element can adopt the set and not set states 'high' (logic 1) and 'low' (logic 0). When activating the switch field 'Send', the complete byte is transferred to the RC. With 'Cancel' the dialog disappears without having transferred the signals.

Setting of rho4 outputs

- from the main menu by <Alt> + <I> and then <S>
- from the pull-down menu by <S>

Selection of the signal state

- Select the selection element of the desired signal with <Tab>. The text next to the selection element is displayed in a frame. The state of the signal can then be set by means of the <Space> bar.

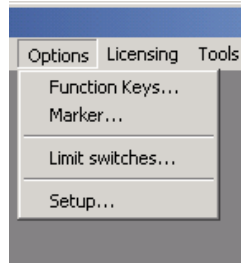
Send to RC

- Select the switch field 'Send' after having set the desired signal states with <Tab> and send the states to the RC by pressing <Enter>

Activation and functions of Online

3.8 Options

Under this menu item, the operator can open or close the function key box and the marker box of the point editor, select the machine parameter file for the limit switch monitoring of the Offline point editor and change the setting of the coupling interface.



Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor activating it by pressing <Enter>

3.8.1 Function keys

Under this menu item the function key box can be displayed or closed.

Switching on/off of function key box

- from the main menu by <Alt> + <T> and then <F>
- from the pull-down menu by <F>

Activation and functions of Online

3.8.2 Marker

Under this menu item, the operator can open or close the marker box. The marker box is a display of the intermediate storage for the point editor. It can be placed anywhere on the screen.

Open/close marker box

- from the main menu by <Alt> + <T> and then <M>
- from the pull-down menu by <M>



A detailed description of the marker functions is to be found in chapter 6.

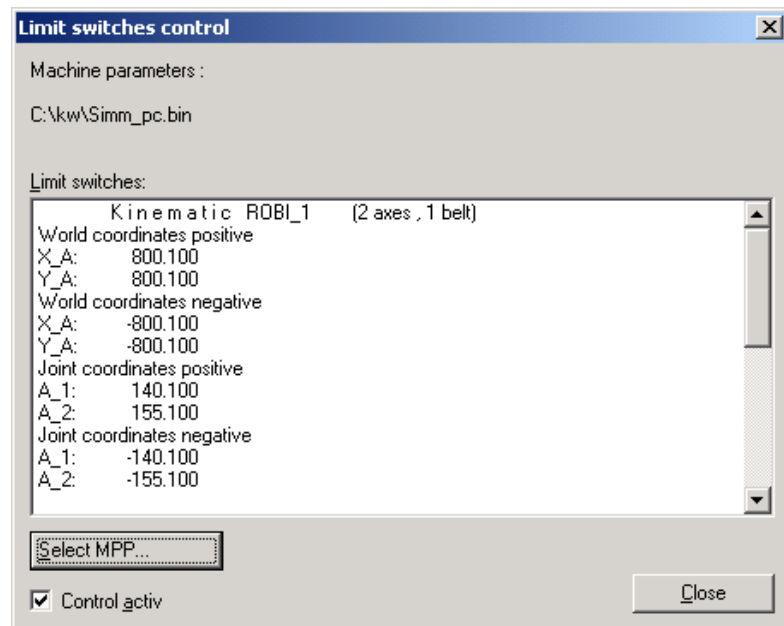
3.8.3 Limit switches

Before each travelling movement, the point values programmed in the control are compared with freely adjustable limit values. A machine movement which exceeds these limits is disabled. When changing point values with the Online point editor, a monitoring process takes place when sending a point to the control. The software limit switches of the machine parameters serve as limit values. Since this information from the RC is missing when working with the Offline point editor, the possibility is offered here to select on the PC any machine parameter file (.bin) the software limit switches of which are to be used for monitoring. The selection of the machine parameter file is made by selecting the pull-down menu point 'Limit switches'.

Activation and functions of Online

Selection of a machine parameter file for the limit switch monitoring

- from the main menu by <Alt> + <T> and then <I>
- from the pull-down menu by <I>



The first text line of the dialog displays the name of the machine parameter file the limit switches of which are used for monitoring. The following list titled 'Limit switches' shows the limit values themselves. If no valid machine parameter file has been selected, this list will remain empty. The machine parameter record can be changed by activating the switch field 'Select MPP'. Then a dialog appears on the screen by means of which the operator can determine the new machine parameter file. This dialog for the determination of files is also used at other places in Online and is described in detail in chapter 8.

The limit switch monitoring can be activated or de-activated by means of the control element 'Control aktiv'. The monitoring is active when a hook is placed next to the control element. The dialog of the Offline point editor also shows in a text whether the monitoring is active or inactive.

Select new machine parameter file

- Select the switch field 'Select MPP' with <Tab> and start the selection by pressing <Enter>. A new dialog appears by means of which a new machine parameter file can be determined.

Activate resp. de-activate the limit switch monitoring

- Select the control element 'Control aktiv' with <Tab> and switch-over by pressing the <Space> bar. A cross in the check box means that the monitoring is active. If the cross is missing, the monitoring is inactive.

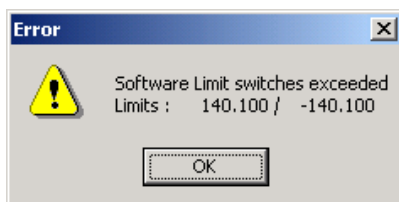
Closing of the limit switch dialog

- Select the switch field 'Close' with <Tab> and terminate the dialog by pressing <Enter>


Activation and functions of Online

If now, with active limit switch monitoring, a component value is entered into the point editor which exceeds these limits, a corresponding message will be displayed. The faulty value is not taken over into the point file.

Example for a text referring to a faulty component value:



The information box must be closed at first by activating the switch field 'OK', before it is possible to continue working with the point editor.

-  **The limit switch is only monitored when a point component is changed. This means that the monitoring system does not recognize values which have already exceeded the limit switch already before the point editor has been called. Belt values are not monitored.**

3.8.4 Setup

Under this menu item the parameters of the serial interface or of the TCP/IP connection which are connected via the PC and the control can be set.

Change interface parameters

- from the main menu by <Alt> + <T> and then <S>
- from the pull-down menu by <S>

Activation and functions of Online

Select connection to rho4

To change interface data close all windows showing rho4 information.

Portname:

Serial device:

Baud:

Data bits:

Parity:

Stop bits:

Flow control:

Timeout:

TCP/IP connection:

IP address/aliasname:

Port number:

Timeout:

In the selection element 'Portname' it has to be determined at first whether control and PC are connected with each other via a serial interface (COM1 to COM4) or via a TCP/IP channel. The following parameters have to be set according to this pre-allocation.

In case of connections via a serial interface, the parameters 'Portname', 'Baud', 'Data bits', 'Parity', 'Stop bits', 'Flow control' and 'Timeout' have to be in accordance with the parameters of the control interface.

If a connection with the control has to be made via TCP/IP, the IP address or the alias name of the network card of the control, the port number and the timeout have to be set.

The admissible values can be selected as follows:

Activation of the selection windows and switch fields

- With <Tab> the individual selection windows for 'Portname', 'Baud' etc. as well as the switch fields can be selected. <Tab> always switches further by one control element, <Shift> + <Tab> switches back by one control element. The selected switch field is marked by a frame, active selection windows by an inverted text. In an active selection window, the adjustment possibilities can be scrolled by means of the cursor keys. The visible adjustment displayed inverted will be taken over. The values for the IP address and the port number have to be entered into the corresponding input fields.

Take-over adjustments

- Select the switch field 'OK' with <Tab> and take them over by pressing <Enter>


Activation and functions of Online

Cancel adjustments

- Select the switch field 'Cancel' with <Tab> and confirm it with <Enter>

Interface parameters can, as a matter of principle, only be changed if no window is open which requires data for its display from the RC, e. g. basic information. If such a window is active, all selection and input elements are displayed in grey, and a change of the interface parameters is not possible.

 **After the installation of ROPS4, TCP/IP is displayed inverted as connection to the control.**

 **If an interface in PHG mode 9.1 or 7.8.3 is changed from “Win.channel” (TCP/IP) to “Ser.channel” (serial) or vice-versa, “Flow control” must be adjusted in the control. In the connection cable between rho4 and PC, the handshake signals must be wired.**

Activation and functions of Online

3.9 Tools

This main menu point can freely be allocated by the user. Here it is possible to integrate program calls which are required for the work with the PC. These programs can be started by the operator from Online without having to quit Online. The text of the main menu point, such as the entries in the pull-down menu, can be freely selected.

3.9.1 Determination of the main menu entry

The freely adjustable main menu point appears in the main menu between the entries 'Licensing' and 'Window'. The operator can here include a self-defined main menu point, called 'Tools' in this description. The determination of the name for this menu point is made via an entry in the initialization file ROPS4WIN.ini, group [Online], PrivMenuName=, see example under point 3.9.3. With the &-character before the corresponding letter it can be determined by which key the main menu point is to be selected, in the example this would be the letter <T>, i. e. by <Alt> + <T> the pull-down menu appears.

Please make sure that in the whole menu line each letter is only underlined once.

3.9.2 Determination of the pull-down menu points

The pull-down menu points which are to appear under the freely selectable main menu point, are also determined in the initialization file ROPS4WIN.ini. The description of these menu points must be under the group [Online-TOOLS] for Online. It contains the freely selectable name of the menu point as well as the call of the desired program. To separate the menu points optically, a dash can be inserted in the menu by using the instruction SEPARATOR=.

 **During the running time of ROPS4, the change of this entry will be without any effect.**

Activation and functions of Online

3.9.3 Determination of a user-specific menu point

The user-specific main menu point should be clearly identified in the menu line by the text 'Tools'. The pull-down menu appears by pressing the key combination <Alt> + <T>. The pull-down menu provides for the call of 'Edit' and the 'MS-DOS' level. When the pull-down menu is displayed, 'Edit' can be selected by <E> and MS-DOS by <M>.

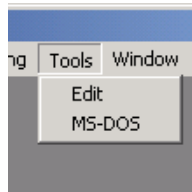
The specified requirements are implemented by the following entries in ROPS4WIN.ini:

```
[ONLINE]                                Group ONLINE
PrivMenuName=&Werkzeug

[ONLINE-TOOLS]                          Group ONLINE-TOOLS
&Edit=c:\rops4\editor.exe
&MS-DOS= c:\winnt\system32\cmd.exe
```

If for a better clarity a separation line is to appear between the two pull-down menu points, the line 'SEPARATOR=' has to be inserted between the lines '&Edit=...' and '&MS-DOS=...'. This separation line is missing in the illustrated example.

The freely determinable main menu point looks as follows after the re-start of Online:



Activation and functions of Online

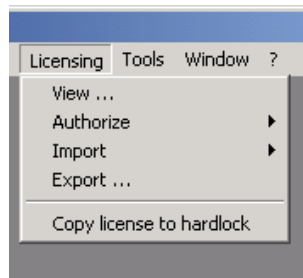
3.10 Licensing

After the installation, the legitimate user of the ROPS4 must have himself registered. ROPS4 is released through the entry of a key number or a key code (number defined by Bosch Rexroth).

All tools are grouped under the main menu item 'Licensing' on the desktop which are required in order to:

- apply for a license
- have an existing license displayed
- transfer a license

By selecting the menu item 'Licensing', the following menu appears:



- ★ To apply for a license command, call 'Authorize'.

There are two types of licensing available:

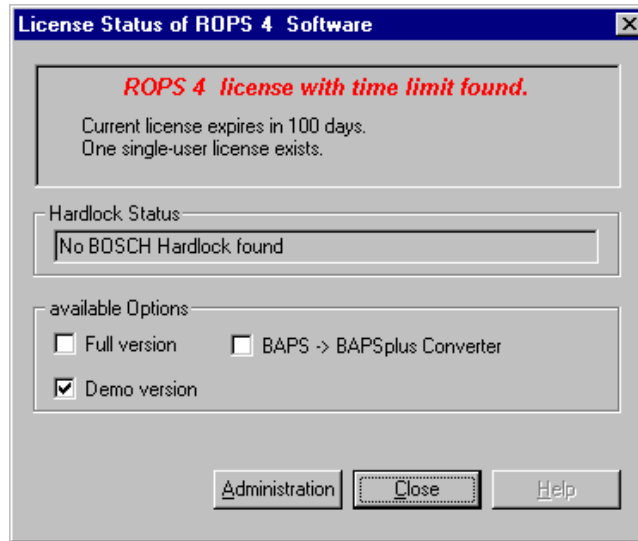
- The hardlock license is saved in a special Dongle. It will be passed on through changing the dongle.
- The crypkey license depends on the computer, path and operating system. It is saved on the hard disk of the PC and only consists of a key number that is assigned during the registration by Bosch Rexroth. In the case of a PC, installation path or operating system change, this license is passed on per transfer disk. A crypkey license can be afterward transferred in a dongle.

- ☞ **A hardlock license has priority over a Crypkey license. It means that the license is always given priority treatment in a hidden dongle and a possibly present Crypkey license is masked. For other instructions, see file 'Readme_ROPS4.wri' on the installation medium or entry 'Schutzadapter' in the file ROPS4.WIN.ini, page 7-2.**

Activation and functions of Online

3.10.1 Display

Under 'View', the state of the current license is displayed, e.g. following dialog:



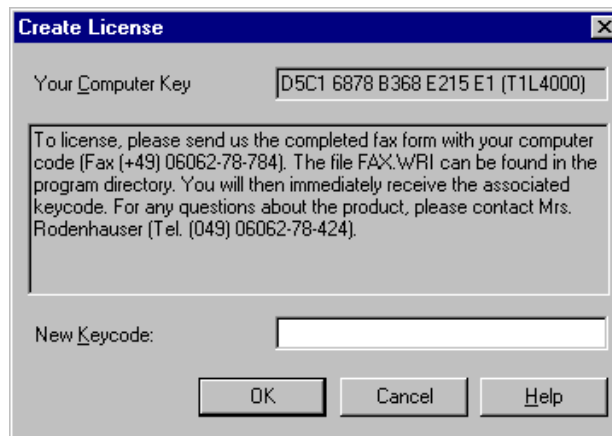
The license displayed here is a demo version license valid for 100 days. There is no dongle.

3.10.2 Authorize

Through activation of 'Authorize', a license (Hardlock or Crypkey) is applied for. The procedure is the same for both license types.

Crypkey license

After selecting the license type crypkey, the following dialog is displayed:



The computer key describes in an unequivocal way the computer on which ROPS4 has been installed. It must be transmitted with the joined FAX form (FAX_ROPS.wri) to Bosch Rexroth. The corresponding key

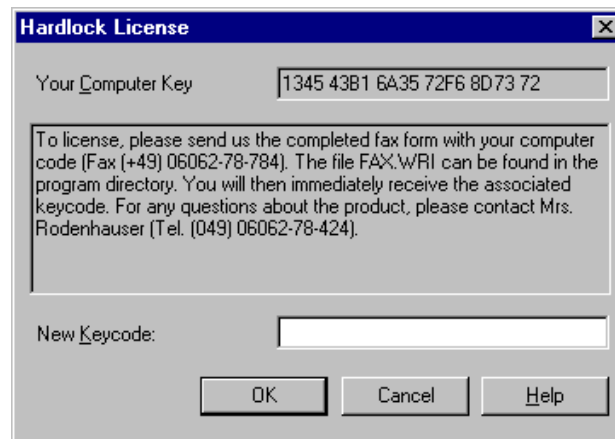
Activation and functions of Online

code (key number) that must be entered into the entry field is calculated from this computer key. The code releases then the protection function. The crypkey license is saved on the hard disk and can only be transmitted via a transfer disk onto other computers, other operating systems or into other paths.

Hardlock license

If the license type Hardlock is selected, a hardlock dongle must be connected to the parallel port of the computer.

After selecting the menu item Hardlock license, the following dialog is displayed:



The computer key describes in an unequivocal way the computer on which ROPS4 has been installed. It must be transmitted with the joined FAX form (FAX_ROPS.wri) to the Bosch Rexroth. The corresponding key code (key number) that must be entered into the entry field is calculated from this computer key. The code releases then the protection function. The license applied for is automatically transferred into the connected dongle. It will be transferred to other computers by plugging into another socket.

3.10.3 Import

'Import' is used for the activation of tools over which a crypkey license can be transferred to another PC, another operating system or another path.

Example of a crypkey license transfer

A user has 2 PCs. ROPS4 is installed on both of them. PC A has a crypkey license, PC B has not. To transfer the crypkey license from PC A to PC B, the user must first insert a formatted disk into the drive of PC B and then select in ONLINE the menu item 'Licensing, Import, Create transfer disk'.

Activation and functions of Online

The user must then insert the disk into the PC A drive and select in ONLINE the menu item 'Licensing, Export'. The crypkey license is transferred to the disk in this way.

The transfer disk must be inserted again into a drive of PC B. The crypkey license is transferred for good through the entry of 'Licensing, Import, Read transfer disk'.

Create transfer disk

By selecting this menu item, a transfer disk is created. It is used for getting a crypkey license from another PC, another operating system or another directory.

Following dialog is displayed:



Read transfer disk

By selecting this menu item, a transfer disk is read. The transfer disk must contain the crypkey license from another PC, another operating system or another directory.

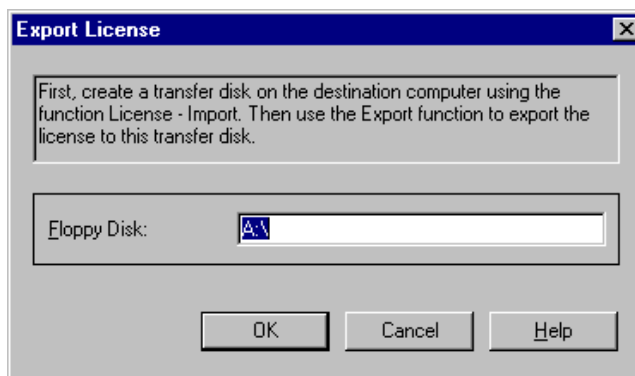
Following dialog is displayed:



Activation and functions of Online

3.10.4 Export

Through 'Export' a crypkey license is transferred to another transfer disk.



☞ **Only a full product licensed correctly can be transferred.**

3.10.5 Copy license to hardlock

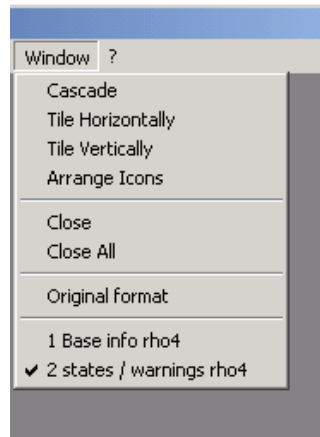
By selecting this menu item, it is possible to convert a crypkey license into a hardlock license afterward and transfer it into a dongle. After the transfer, the license is saved in the dongle. The license on the PC is deleted.

☞ **It is possible to transfer only full versions into the dongle. A crypkey license transferred once can no longer be transferred back from the dongle.**

Activation and functions of Online

3.11 Window

This menu point serves the easier handling of several document windows, i. e. windows in which e. g. basic information or process lists are displayed. The document windows are placed on the screen in a specific arrangement which can essentially contribute to clarity. It is furthermore possible here to bring document windows that have been changed in size back to their original sizes.



The last two menu entries refer to open documents. In the illustration, the display of the basic information and the display of the status messages are active. The number of these menu points depends on the number of open documents. The pull-down menu can be closed by pressing <Esc>.

Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor activating it by pressing <Enter>

3.11.1 Handling of document windows

Online provides several functions the instruction resp. appearances of which are displayed in so-called document windows. The designation 'document window' only means that several of these windows and the actions connected with them can be displayed on the screen simultaneously. Windows of this type can be arbitrarily moved on the screen, changed in size or reduced to a symbol. The actions that can be activated via the main menu point 'Window' refer exclusively to document windows.






If the document with the basic information is e. g. reduced to a symbol it looks like as follows:



Activation and functions of Online

To be also able to distinguish document windows in their reduced statuses, the specific icon of the function appears in the left corner.

The following list names the types of document windows available in Online and shows the associated icons

Function	Icon
PC list	
Offline point editor and Online point editor	
rho4 list, process list, process state, kinematic info, axis positions rho4, axis positions KinX, world coordinate system KinX, tool coordinates KinX, basic information and state messages	
State signals RC Input/Output	RC 
State signals digital Input/Output	DIG 

Switching-over between several document windows

- <Ctrl> + <F6>

Reduce document window to symbols

- Select desired window with <Ctrl> + <F6>, the title line is displayed inverted. With <Alt> + <-> an additional pull-down menu, the system menu, appears. By pressing <N> (minimize) the window is reduced to its symbol.

Zoom symbol to document window

- Select desired symbol with <Ctrl> + <F6>, the text underneath the icon is displayed inverted. The system menu is called with the keys <Alt> + <->. By pressing <R> (restore) the symbol is zoomed to a document window.

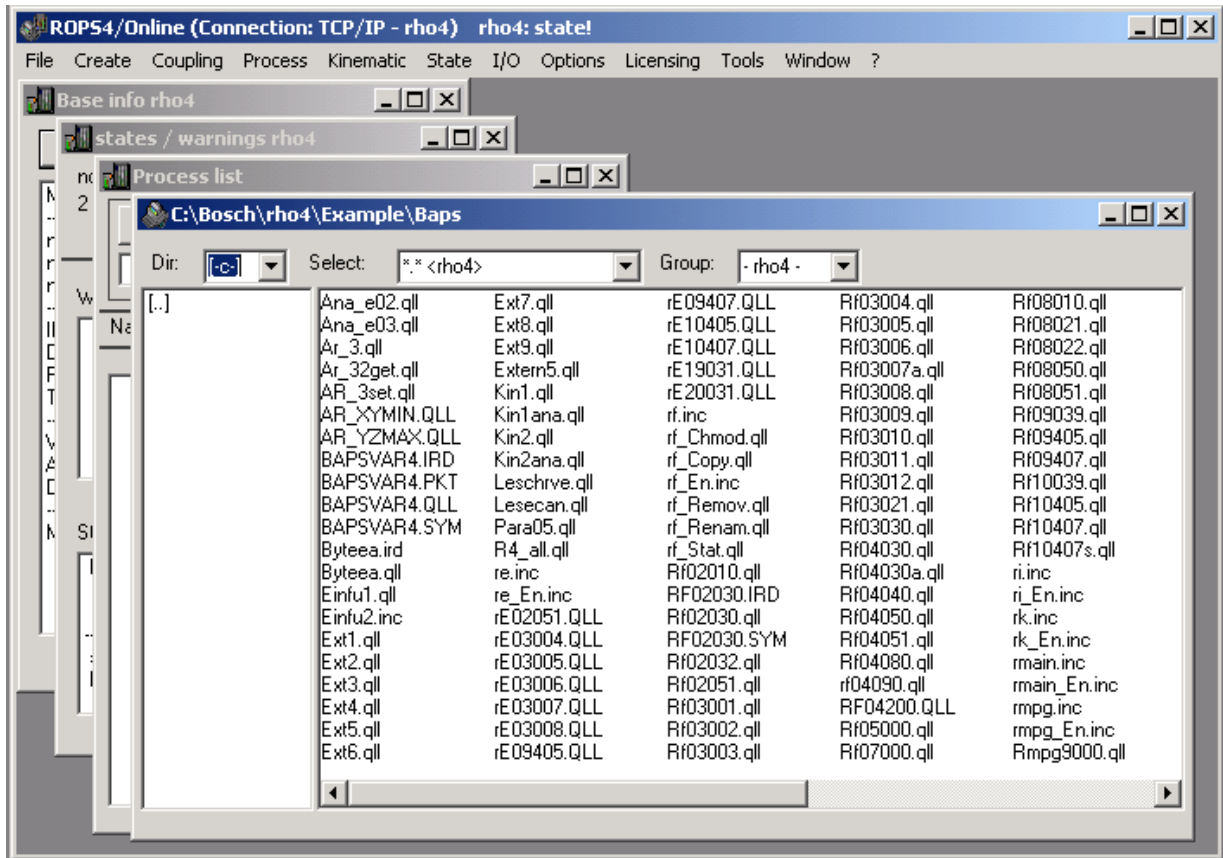
Arrange symbols of document windows

- from the main menu by <Alt> + <W> and then <R>
- from the pull-down menu by <R>

Activation and functions of Online

3.11.2 Cascade

All document windows are displayed in a cascade arrangement



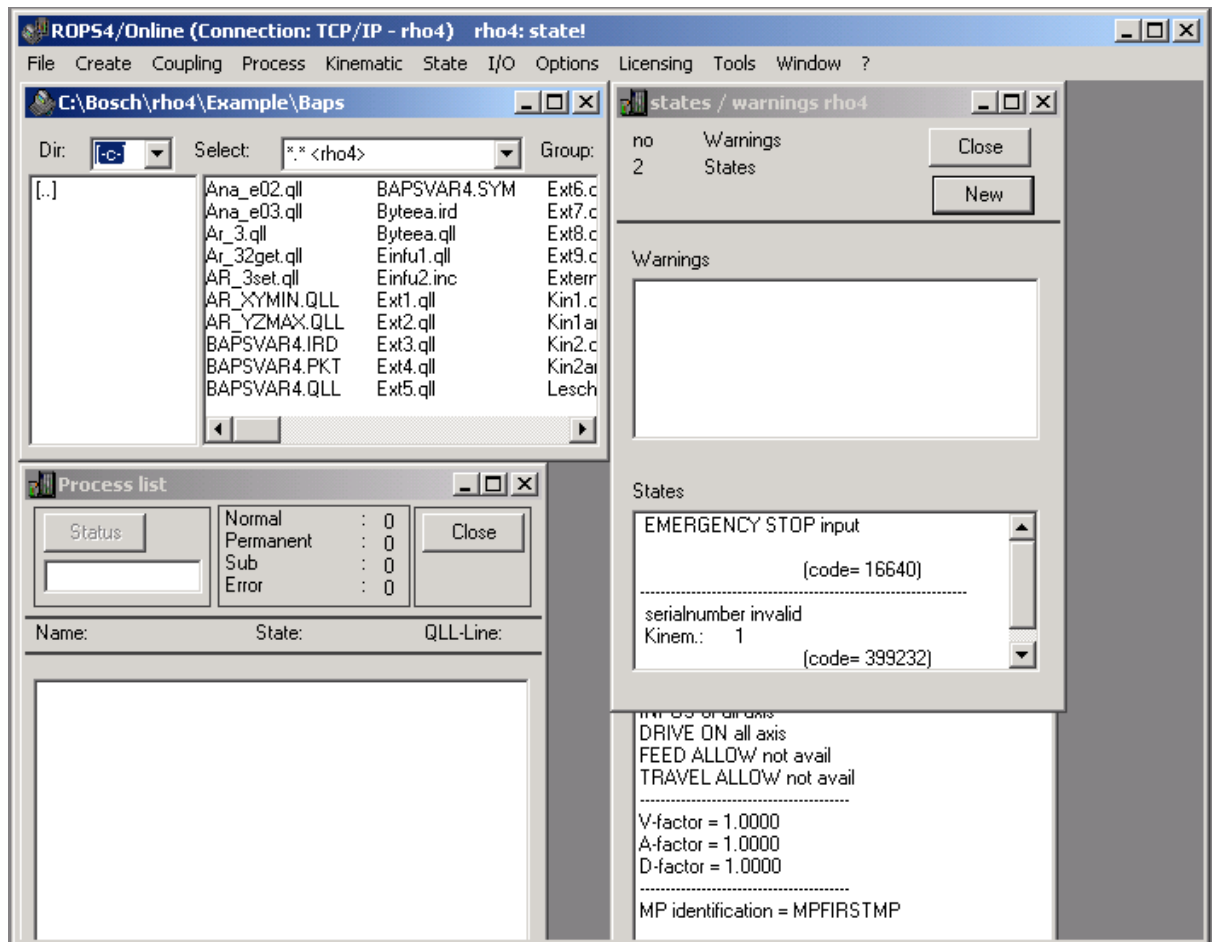
Overlapping presentation of all document windows

- From the main menu by <Alt> + <W> and then <C>
- From the pull-down menu by <C>

Activation and functions of Online

3.11.3 Tile horizontally

All document windows are displayed one beside the other



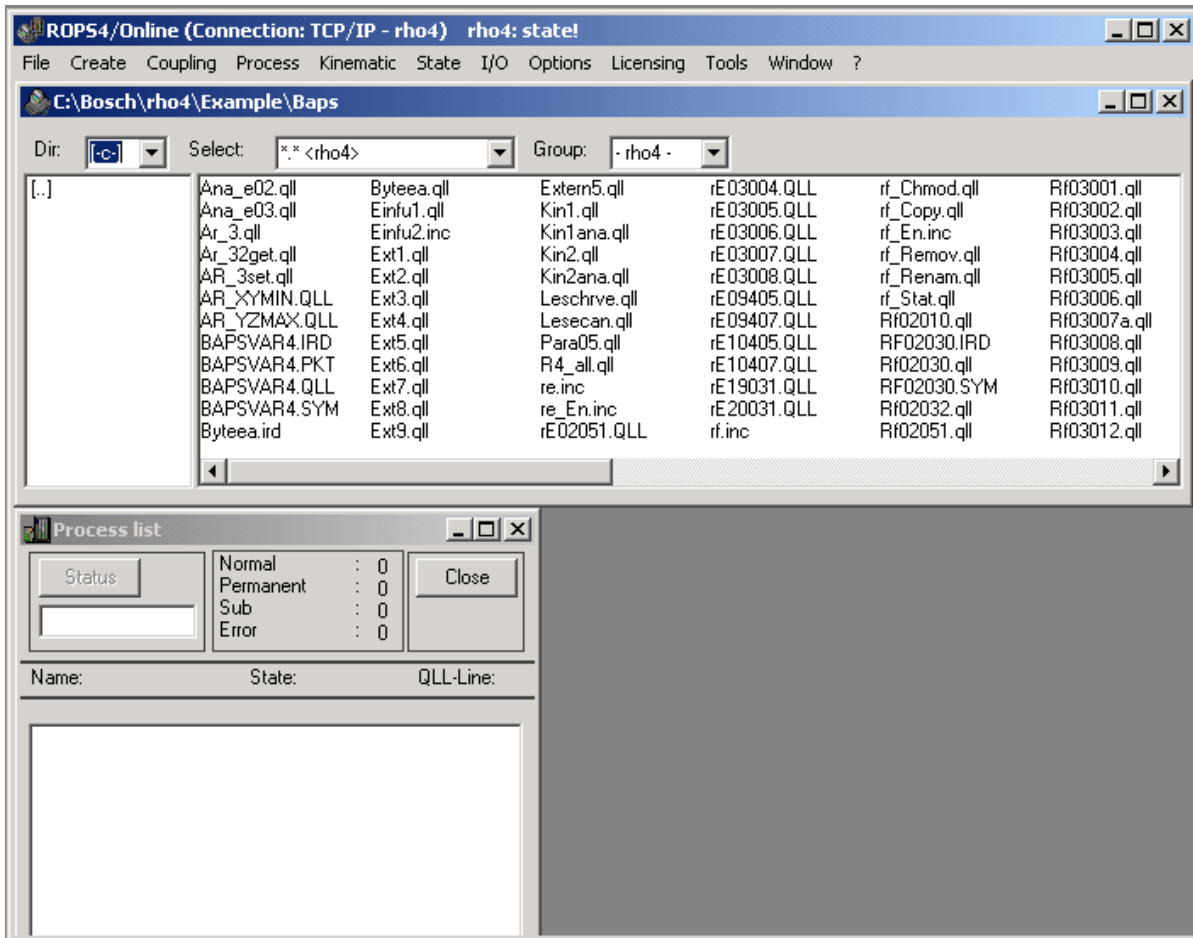
Presentation of all document windows one beside the other

- from the main menu by <Alt> + <W> and then <H>
- from the pull-down menu by <H>

Activation and functions of Online

3.11.4 Tile vertically

All document windows are displayed one upon the other



Presentation of all document windows one upon the other

- from the main menu by <Alt> + <W> and then <V>
- from the pull-down menu by <V>

Activation and functions of Online

3.11.5 Arrange icons

This menu point only applies to the document windows reduced to symbols. The symbols are arranged at the bottom of the window.

Arrange symbols of document windows

- from the main menu by <Alt> + <W> and then <R>
- from the pull-down menu by <R>

3.11.6 Close All

By selecting this menu point, all document windows are closed and the associated actions terminated.

Close all windows

- from the main menu by <Alt> + <W> and then <O>
- from the pull-down menu by <O>

3.11.7 Original format

ROPS4 remembers the sizes and positions of all document windows once opened. This also applies to the exit and re-start of ROPS4. By selecting this menu point, the active document window is again presented in original size. Original size means the size and the position of a document after the installation of ROPS4.

Display document window in original size

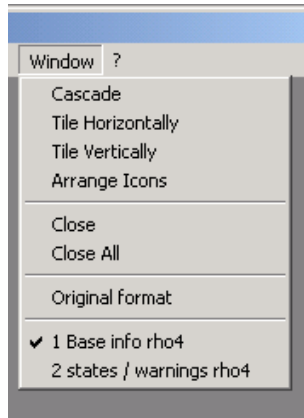
- from the main menu by <Alt> + <W> and then <O>
- from the pull-down menu by <O>

Activation and functions of Online

3.11.8 List of all open document windows

At the end of the pull-down menu that appears after the selection of the main menu point 'Window', one or several other menu points can follow. Each open document window (process list, status error etc.) is listed there as a menu point. This list gives the quick overview and serves the selection of a document window via the menu.

The currently active document window is identified by a hook.



In the illustration, the additional menu points 1 and 2 refer to the open document windows of the basic information and the status messages.

The currently active document window is the display of the basic information.

Select document window

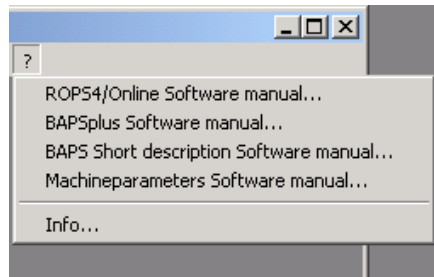
- from the main menu by simultaneously pressing <Alt> + <W> and subsequent acknowledgement of the corresponding number in front of the listed points (in the illustration, the numbers 1 and 2 would be possible)
- from the pull-down menu by the corresponding number

Activation and functions of Online

3.12 ?

This main menu point serves to activate the help function for the operator and supplies information on the current version of Online with copyright remarks.

When activating the main menu point '?', the following pull-down menu appears:



For activating individual pull-down menu points the same operation is necessary as for the main menu points. The pull-down menu can be closed by pressing <Esc>.

Possibilities for the selection of pull-down menu points

- Enter the underlined letter of the desired menu point
- Mark the desired menu point with the cursor activating it by <Enter>.

3.12.1 Help

During the entire running time, the operator can access in Online several manuals.

The manuals are displayed by means of the 'Acrobat Reader'. The Reader is supplied with ROPS4 and can be installed from the ROPS data carrier. The information for the installation of the Reader is contained in the file Readme_ROPS4.wri if required.

The handling of the manuals is determined by the 'Acrobat Reader' and is not further explained here.

Call manual ROPS4/Online

- from the main menu by <Alt> + <?> and then <R>
- from the pull-down menu by <R>
- by <F1>

Call manual BAPS plus

- from the main menu by <Alt> + <?> and then
- from the pull-down menu by

Activation and functions of Online

Call manual BAPS Short Description

- from the main menu by <Alt> + <?> and then <A>
- from the pull-down menu by <A>

Call manual Machine parameters

- from the main menu by <Alt> + <?> and then <M>
- from the pull-down menu by <M>

Terminate the display of a manual

- by closing the Acrobat Reader

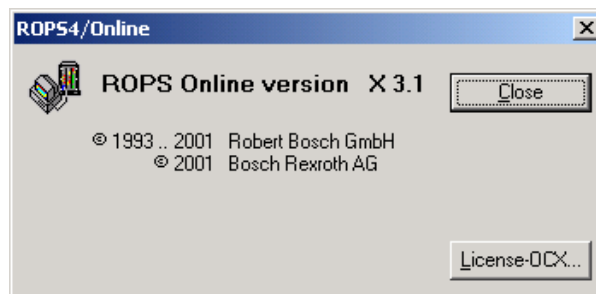
Switching-over to Online (manual remains active in the background)


- Select 'Online' from all active Windows actions offered for selection with the active Reader with <Alt> + <Tab> and switch-over to 'Online' by releasing <Alt>

 **The Acrobat Reader is not closed automatically when terminating Online.**

3.12.2 Info

When selecting the pull-down menu point 'Info', the operator is offered information on the Online version and copyright remarks on the screen.



 **The display window must be closed by pressing <Esc> or the switch field 'Close', otherwise it will not be possible to continue working with Online.**

Display information on Online

- from the main menu by <Alt> + <?> and then <I>
- from the pull-down menu by <I>

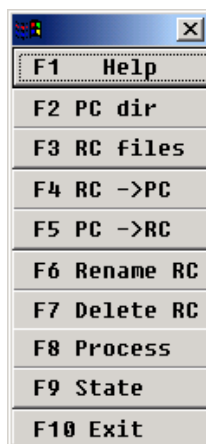
The function key box

4 The function key box

The function key box has two tasks. On the one side it helps to remember the function key allocation <F1> to <F10>, and on the other hand it is possible to click onto the switch fields with the mouse which has the same effect as pressing the function keys.

With an active function key box, the title line (here without text) is displayed inverted, the desired function key can also be selected with <Tab> and activated with <Enter>.

The function key box can be opened or closed by the menu function 'Option/Funktionstasten', see point 3.8.1. It can be placed anywhere on the screen. The individual actions that can be activated by the function keys are described in chapter 5.



Activation of the function key box

- Select the function key box with <Alt> + <F6>, the title line is displayed inverted

Start the individual actions

- Select the individual switch fields by means of the cursor keys. The currently selected switch field is framed. Activation by pressing <Enter>

Direct start of an action

- Press corresponding function key (<F1> to <F10>) on the keyboard or click on the switch field in the function key box

The function key box

Notes:

Function key assignment

5 Function key assignment

The function keys in Online have the following assignments

<F1>	Help	Call of the manual ROPS4/Online, see point 3.12.1
<F2>	PC Dir	Lists the files on the PC, see point 3.1.1
<F3>	RC Files	Lists the files in the control, see point 3.3.1
<F4>	RC ⇒ PC	Copy files from the control to the PC, see point 3.3.2
<F5>	PC ⇒ RC	Copy files from the PC to the control, see point 3.3.3
<F6>	Rename RC	Rename files in the control, see point 3.3.4
<F7>	Delete RC	Delete files in the control, see point 3.3.5
<F8>	Process	Call of process state, see point 3.4.2
<F9>	State	Indication of state messages of the control, see point 3.6.2
<F10>	Exit	Terminate ONLINE

Function key assignment

Notes:

The marker box

6 The marker box

The marker box is a help-tool for the point editor. Behind this box there is an intermediate storage where point values can be stored and read again. So it is possible e.g. to pre-occupy points with the same value in a simple way and without having to write a lot or to copy values to other points.

 **For being able to use the functions of the intermediate storage, it is not absolutely necessary to see the marker box.**



Open/close the marker box

- from the main menu by <Alt> + <T> and then <M>
- from the pull-down menu by <M>

Store a point in the intermediate storage

- from the main menu by <Alt> + <C> and then <P>
- from the pull-down menu by <P>
- by <Shift> + <F2>

 **Before filing the value, the point must be selected, i.e. the point name must be displayed inverted in the point list.**

Occupy a point with the value in the intermediate memory

Before being able to occupy a point with the contents of the intermediate storage, the latter must be selected. The name of the point in the point list is then displayed inverted

- from the main menu by <Alt> + <C> and then <M>
- from the pull-down menu by <M>
- by <Shift> + <F3>

 **Points are only completely stored or set. Storing or setting by components is not possible.**

The marker box

Notes:

The file ROPS4WIN.ini

7 The file ROPS4WIN.ini

In the entire ROPS4, the file ROPS4WIN.ini serves the initialization and the presetting in the starting phase as well as the storing of different settings carried out during the runtime of Online, e.g. interface parameters. The operator has the possibility of adapting Online to his needs by the corresponding entries into this file. The entries can be made with any ASCII editor. The indicated values are entered at the time of installation.

The following entries in ROPS4WIN.ini are decisive for Online

Interface parameters

 **The listed values are preset for the interface after installation.**

[ONLINE]

AskForConnection=0	Determines whether the additional dialog before building up a connection is displayed or not
COM=TCP/IP	Connection to the RC. Possible is: COM1 to COM4 and TCP/IP
BAUD=9600	Baud rate
DATA=8	Number of data bits
STOP=1	Number of stop bits
PARITY=N	Parity
HANDSHAKE=1	Hardware handshake
TCPALIAS=rho4	IP address or alias name of the TCP/IP connection
TCPKANAL=6010	Channel number, see manual of rho4-GateWay
TIMEOUT=4	Timeout time for serial connection
TCPTIMEOUT=10	Timeout time for TCP/IP connection

Presettings for Online

[ONLINE]

ShowWorkDir=1	0 = actual working directory is not displayed in the title bar 1 = actual working directory is displayed in the title bar
ftasten=1	0 = function key box not visible 1 = function key box visible
merker=1	0 = marker box not visible 1 = marker box visible


The file ROPS4WIN.ini

Zeilennummer=1	0 = printout without line number 1 = printout with line number
WorkingDir=D:\MUE\PICPR	Working directory of Online
Onlinetimer=500	Refresh time in ms for dynamic displays
english=(dependent on version)	Library for internal data (English) This entry must not be changed!
deutsch=(dependent on version)	Library für internal data (German) This entry must not be changed!
PrivMenuName=&Werkzeug	Menu point which can be defined by the user, see section 3.9. The text which is entered here, appears in the main menu line of Online. The pull-down menu points are defined in the group [ONLINE-TOOLS].
edname=(dependent on installation)	Here, the name of the editor is indicated which is called under menu point 'Create, Editor'. The call of the enclosed ASCII editor is preset.
TRCHECK=0	0 = no limit switch monitoring of the point editor 1 = limit switch monitoring of the point editor is active The entry is only valid for the Offline point editor
Schutzadapter=Dongle	By modifying this entry, a crypkey license can have priority even if a dongle is plugged. Dongle = Hardlock has priority Crypkey = Crypkey license has priority
Strobe=200	Strobe time in ms for the signal RCO 27.1 'Process start via PG'. In this time, the RC output stops on 1 before being reset again, see section 3.4.4 Start.
[ONLINE-TOOLS]	Pull-down menu points which can be freely defined. This entry is not pre-occupied, see section 3.9
[DEFEXTENSION]	In case of data transfer, deleting and listing of files with wildcards, only those files are selected the extensions of which agree with the filter 'Ext=' of the ini-file. The extension bin (machine parameters) is not considered for transfer and deletion with wildcards.


The file ROPS4WIN.ini

```
EXT=*.QLL;*.IRD
```

By this example of a file filter, only files with the extension qll and ird are offered for file functions. All other files remain invisible when working with wild-cards. If no filter is to be active, i.e. all files with arbitrary extension are permitted, the filter must be set in comment (//EXT=) as shown in this example.

 **The notation of the filter must be observed (*.ext and semicolon as separator!).**

 **All other entries have only an internal meaning and must not be changed.**

 **The refresh time of the Online timer is preset to 500 ms, but it can be adjusted at will. The entire system can be blocked if this time is set too low. A minimum time cannot be indicated as that depends on the entire load of the system.**

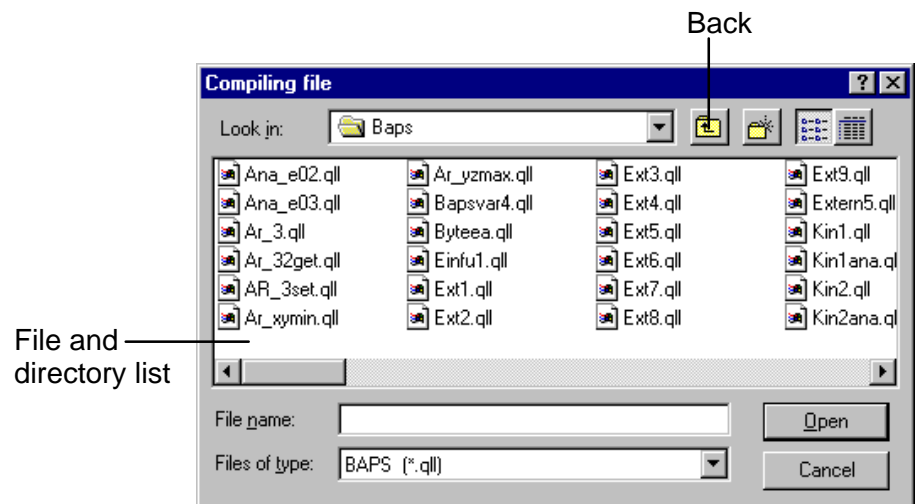
The file ROPS4WIN.ini

Notes:

Selection of a file

8 Selection of a file

The selection of any file on the PC is generally carried out in ROPS4 via the same dialog.



This dialog is a system dialog of Windows and is also used by other applications for selecting files. In the following, operation possibilities via keyboard are only described as examples.

Selection of the different control elements

- With <Tab>, the individual control elements of the selection dialog can be selected. <Tab> switches forward by one control element, <Shift> + <Tab> switches back for one control element. The selected control element is characterized by a frame.

Enter file name

- Select with <Tab> the input field 'File name:' and enter the complete name (with path). Terminate the input with <Enter>
- Select with <Tab> the file and directory list and mark the desired file with the cursor keys. The marked files names are displayed correspondingly in the input field 'File name:'. Terminate input with <Enter>. The desired file name must be inverted.

Selection of a directory

- Select the file and directory list with <Tab> and mark the desired file with the cursor keys. Terminate input with <Enter>. In the file and directory list, all files of the directory and their sub-directories are listed. The display element 'Look in' documents the content of the currently listed directory. For going back a step in the directory structure, the operating element 'Back' must be selected together with <Tab> and acknowledged with <Enter>

Changing of the selection filter of the file type

- Select with <Tab> the selection list 'File of type:' and the desired format with the cursor keys. Terminate input with <Enter>. The files in the file and directory list now correspond to the newly set filter

Selection of a file

Termination of the file selection

- Select with <Tab> the switch field 'Open' and terminate with <Enter>

Abort of the file selection

- Select with <Tab> the switch field 'Cancel' and terminate with <Enter>

TCP/IP settings for ROPS4

9 TCP/IP settings for ROPS4

Additional information can be found in the rho4.1/rho4.0 manual, 'System Description', chapter 'Small net with switches'.

9.1 Cable

For direct connection (without network, without switch) from the PC on which ROPS4 runs to the rho4, e.g. the following cable can be used:

Designation	Order No.
Ethernet cable, 2,5 m long, 10Base-T crossed	1070 919 188

To make the connection from the PC on which ROPS4 runs through one or several switches to the rho4, e.g. the following cables can be used:

Designation	Order No.
Ethernet cable, 2,5 m long, 10Base-T uncrossed	1070 918 793
Ethernet cable, 5 m long, 10Base-T uncrossed	1070 919 258
Ethernet cable, 10 m long, 10Base-T uncrossed	1070 921 384
Ethernet cable, 25 m long, 10Base-T uncrossed	1070 918 796

TCP/IP settings for ROPS4

9.2 Connecting ROPS4 via TCP/IP

ROPS4 (Online) can be connected to a rho4:

- serially
- via TCP/IP

Running:

- directly on a rho4.1 (not possible with a rho4.0)
- on an external PC (e.g. Laptop)

 **If ROPS4 runs directly on a rho4.1, coupling must be made via TCP/IP.**

9.2.1 Running ROPS4 on a rho4.1

Settings on the rho4.1

If ROPS4 runs on the rho4.1 and is coupled to this rho4.1, all settings are made as defaults both on the rho4.1 and in ROPS4.

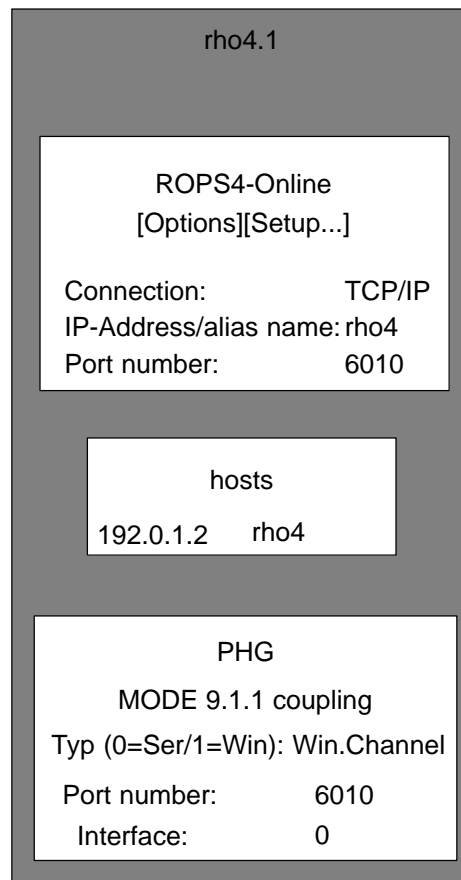
1. The hosts file contains the entry: 192.0.1.2 rho4.

It can be found:

- For WindowsNT e.g. in C:\Windows\System32\drivers\etc or C:\WinNT\System32\drivers\etc.
2. On the PHG, the following is set under MODE 9.1.1 Coupling:
 - Type (0=Ser/1=Win): Win. Channel
 - Port number: 6010
 - Interface : 0
 3. In the setup of ROPS4-Online ([OPTIONEN][SETUP...]) the following is set:
 - Connection: TCP/IP
 - IP-Address/Alias name: rho4
 - Port number: 6010

TCP/IP settings for ROPS4

Example



Running ROPS4 on an external PC

Settings on the external PC

If ROPS4 runs on an external PC (e.g. laptop) coupled to the rho4.0/rho4.1, the settings are as follows:

1. The 'hosts' file contains the entry: AAA.BBB.CCC.DDD rho4_XXX

AAA.BBB.CCC.DDD IP address of the physical Ethernet connection of the "rho4_XXX"

rho4_XXX symbolic name for the rho4.1 to be coupled, e. g. 193.0.0.1 rho41_1

It is to be found:

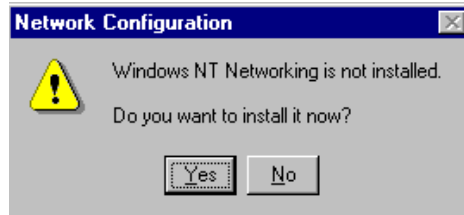
- For Windows NT e.g. in C:\Windows\System32\drivers\etc or C:\WinNT\System32\drivers\etc.

TCP/IP settings for ROPS4

- IP address and the Subnet Mask need to be defined at [Start] [Settings] [Control Panel] [Network] [TCP/IP -> "Name of Ethernet connection"] [Properties] [IP Address] [Specify an IP address].

Only with Windows NT:

After selecting the item "Network" in the Control Panel, the following window is displayed:.

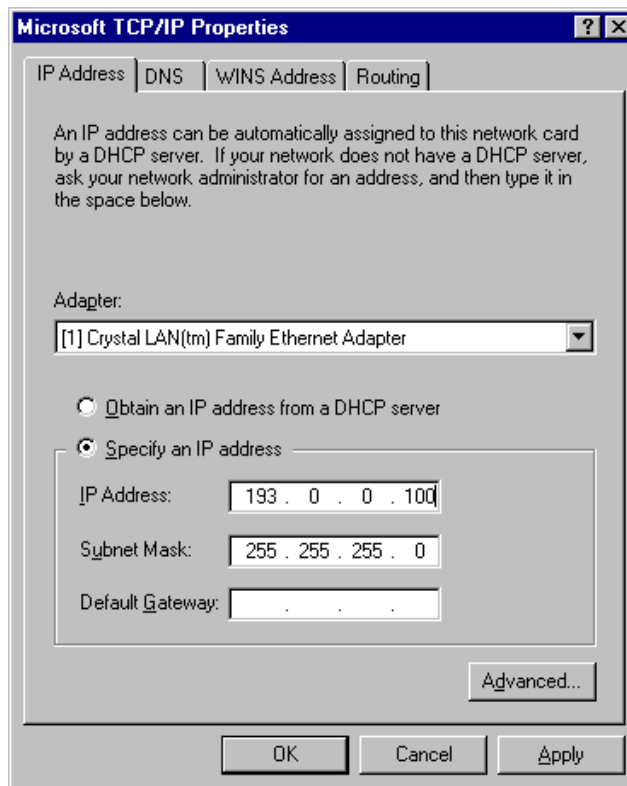


 **Do not enter "Yes". Close this window by pressing "No".**


Example for the IP address settings:

IP address: 193.0.0.100

Subnet mask: 255.255.255.0



TCP/IP settings for ROPS4

 **If it is desired to integrate the PC in which ROPS4 runs into an existing network, the IP address and Subnet Mask should be set by the network administrator.**

3. In the set-up of ROPS4 Online ([Options][Setup...]), the following is set:
 - Connection: TCP/IP
 - IP address/alias name: rho41_1
 - Port number: 6010

Settings on the rho4.1

If ROPS4 runs on an external PC, the following settings are made on the rho4.1:

1. The hosts file contains the entry: 192.0.1.2 rho4.
It can be found:
 - For WindowsNT e.g. in C:\Windows\System32\drivers\etc or C:\WinNT\System32\drivers\etc.

2. On the PHG, the following is set under MODE 9.1.1 Coupling:
 - Type (0=Ser/1=Win): Win. Channel
 - Port number: 6010
 - Interface : 0

3. The file 'GateWay.ini' contains the following entries:

```

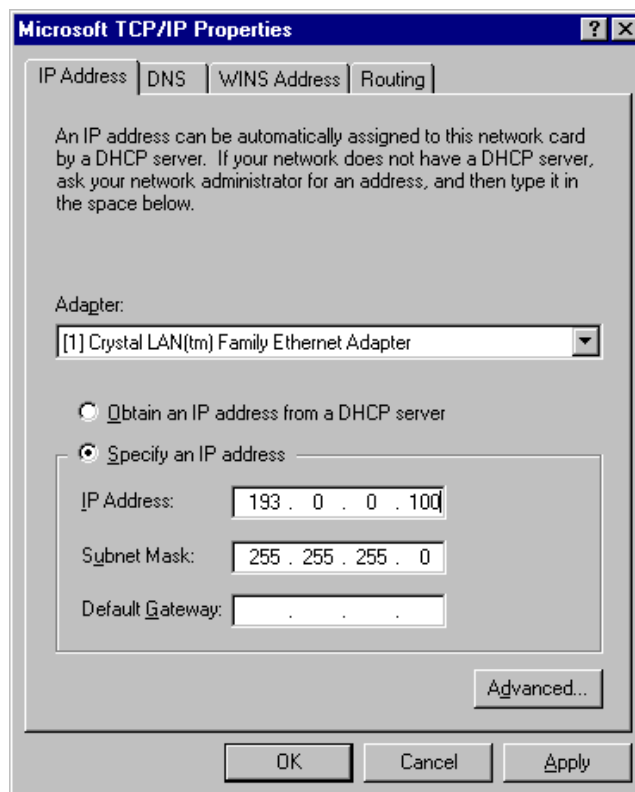
Connection      = 1
1                = coupling
[Coupling]
ServerAlias     = rho4
ServerPortNo    = 6010
GateWayPortNo  = 6010
Msglen          = 256
TCP/IP_NoDelay = 1

```

The file GateWay.ini is to be found in the directory 'C:\Bosch\rho4\Winexe'. If it is desired to address more channels via the GateWay in addition to the coupling channel, the desired number of channels needs to be set in "ConnectionNo".

4. The GateWay needs to be started via the file 'GateWay.exe' to establish a connection for ROPS4. The GateWay.exe can be found in directory C:\Bosch\rho4\Winexe.
5. IP address and the Subnet Mask need to be defined at [Start] [Settings] [Control Panel] [Network [TCP/IP -> Crystal LAN(tm) Family Ethernet Adapter] [Properties] [IP Address] [Specify an IP address].

TCP/IP settings for ROPS4

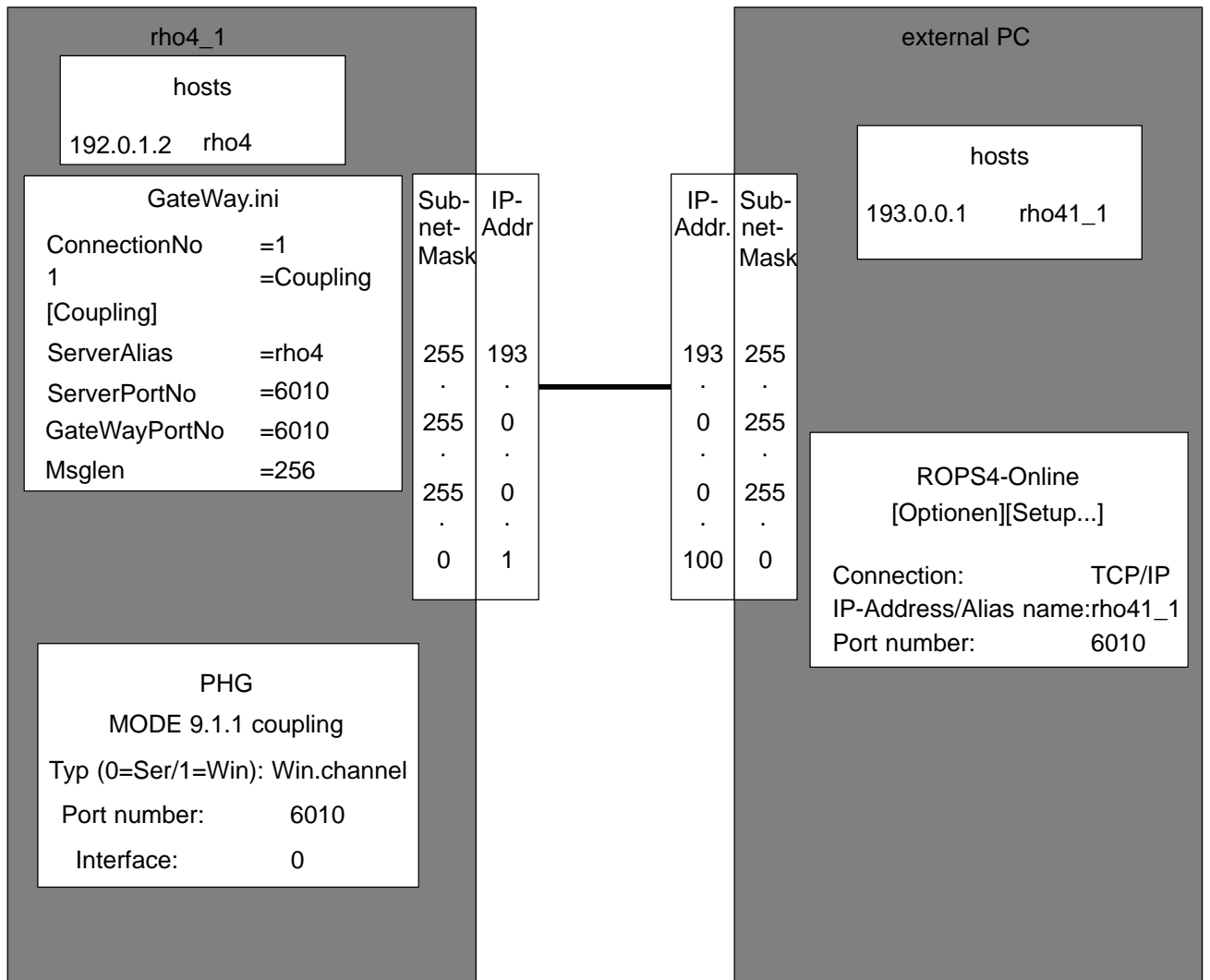


- ☞ If it is desired to integrate the rho4.1 into an existing network, the IP address and Subnet Mask should be set by the network administrator.

TCP/IP settings for ROPS4

Example 1

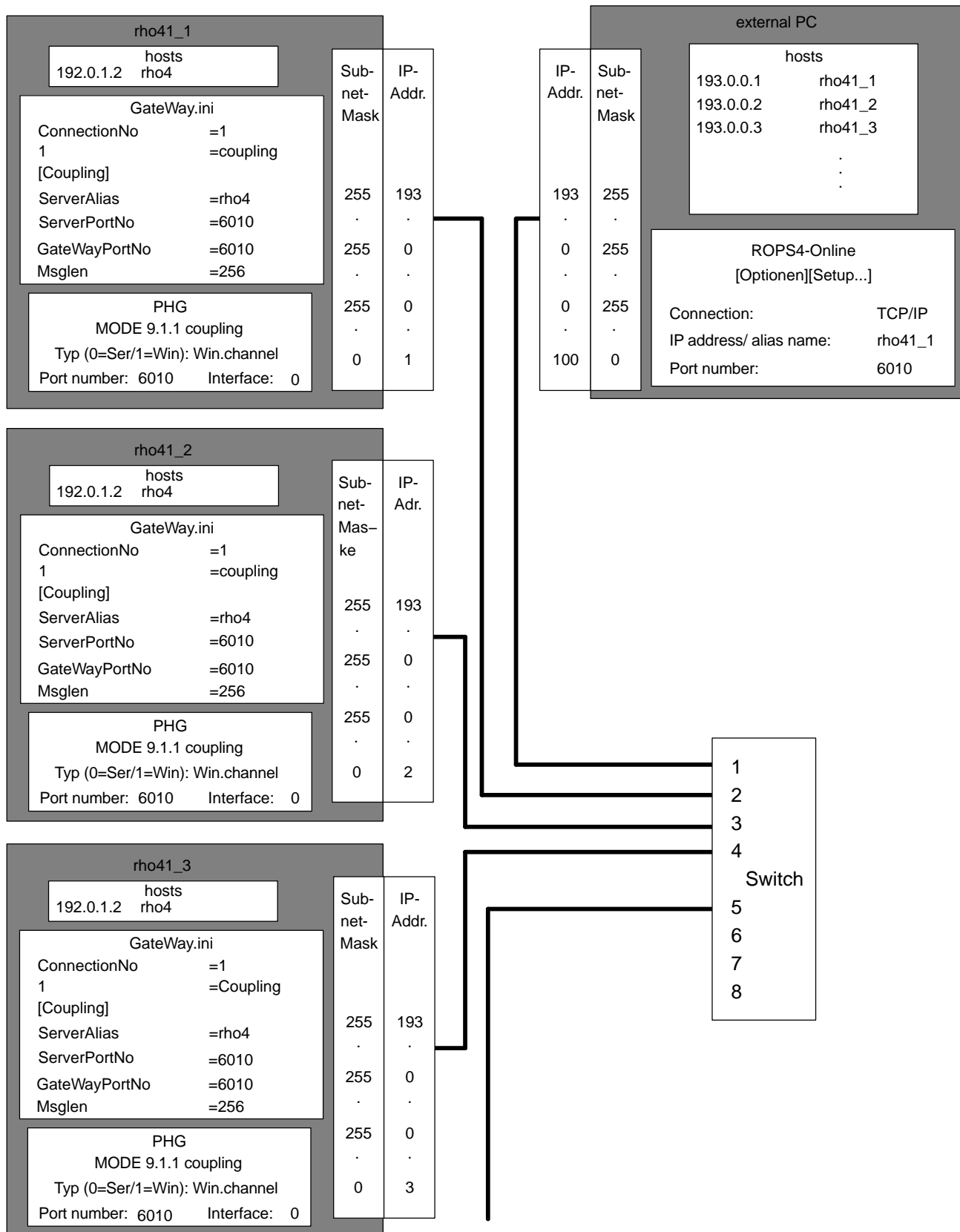
Coupling of an external PC with ROPS4 to a rho4.1



TCP/IP settings for ROPS4

Example 2

Coupling of an external PC with ROPS4 to several rho4.1



Appendix

A Appendix

A.1 Abbreviations

Abbreviation	Meaning
BAPS3	Programming language; Bewegungs- und Ablaufprogrammiersprache, Version 3; programming language
C:	Hard disk drive
CAN	Controler Area Network
DAC	Digital-analog converter
EEPROM	Electronically erasable programmable read-only memory
EGB	Elektrostatic sensitive components
ESD	Electrostatic discharge
LF	Line feed
MPP	Machine parameter program
MSD	Machine state display
PCL	Memory-programmable control
PE	Protective earth
PHG	Hand-held programming unit
POS	Actual position
PTP	Point to point
RC	Robot control
ROD	Incremental encoder
RPM	Rounds per minute
ROPS4	Robot programming system for rho4
TCP	Tool center point
WC	World coordinates

Appendix

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