WinPCL4 with VisualMotion 9 Interface

Application Manual

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Type of Documentation	Application Manual
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Purpose of Documentation	This documentation describes …
	the installation of WinPCL version 4 software and the commissioning of an ISP200 in a VisualMotion system.

Record of Revisions

Description	Release Date	Notes
01	04/03	Initial Release

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Note   This document has been printed on chlorine-free bleached paper.

Table of Contents

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1   System Overview

1.1   Documentation Source

The installation software and the documentation for the "WINPCL04 VisualMotion 9" system can be installed from the CD. This CD contains documentation and software listed in this table.

File type	Description	Type code	Part Number
Documentation	System Configurator	DOK-CONTRL-SYS*SER*V21-AW01-EN-P	293 097
Documentation	Function Interface	DOK-CONTRL-FUN*INT*V06-AW01-EN-P	290 470
Documentation	System Configurator for DeviceNet	DOK-CONTRL-SYCON****DN-AW01-EN-P	292 714
Documentation	System Configurator for Profibus	DOK-CONTRL-SYCON****DP-AW01-EN-P	292 712
Documentation	OPC Server (PLC)	DOK-CONTRL-OPC*SERVER*-FK01-EN-P	288 880
Software	WinPCL (PLC programming tool)	SWD-VMT*PC-PO*-04VRS-MS-CD650	296 130
Software	SYCON (Fieldbus configurator)	SWD-SYCON*-INB-01VRS-MS-FILE*	291 496

Table 1-1: Reference Documentation

1.2   Technical Terms

The following table describes some technical terms used throughout this manual.

Term	Explanation
PLC	Programmable Logic Control
MTS-R	PLC hardware
ISP200	PLC hardware + firmware
WinPCL	PLC programming environment
PPC	Motion Control Hardware
VisualMotion	Motion Control programming environment and system solution for Automation and Packaging machines

Table 1-2: Technical Terms

1.3   System Requirements

To install the PLC programming software "WinPCL04" for the "VisualMotion 9" system (control component 'MTS-R'), the specified PC should have the following prerequisites.

Hardware

- 300 MHz Pentium III or comparable processor.
- At least 128MB RAM - depending on the PLC program size, the memory should be expanded.
- Screen resolution at least 640*480.
- At least 100MB of free memory should be available on the hard disk for the WinPCL installation.
- An available serial port (RS232, RS422 or RS485) must be available to connect to the control.

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Software and Settings

- Windows NT4.0 operating system with at least SP5 or Windows 2000

- Internet Explorer 4.01 or higher

- The color palette should be set to at least 16 colors.

- At installation, system files are copied and entries are made in the system registry. To make this possible during installation, it is necessary that "Administrator rights" be entered for the user by selecting "*Start menu ⇒ Programs ⇒ Administrative Tools (Common) ⇒ User manager*".

1.4 Target Directories

During installation, files are copied to the following directories:

- Windows NT system directory (e.g.: "**C:\WINNT**\System32". The installation directory of Windows can be queried in the prompt with 'echo %windir%'.)

- directory for shared files (e.g.: "**C:\Program files\Common files**\IndShared". This directory is in the installation drive of WinNT in 'Programs\Common files'.)

- and to the installation directory that can be selected during installation (e.g.: "**C:\Program files\Rexroth\WinPCL**").

Necessary drivers and actual system files for the application are stored in the Windows NT system directory. In subdirectory "IndShared" of folder "Common files" all files are stored that are not dependent on the version. The remaining files belonging to the application are stored in the installation directory.

2 WinPCL Installation and Startup

2.1 WinPCL Installation

The WinPCL CD-ROM will automatically run when inserted in to your CD drive. The I-View browser opens and displays options used for the installation of software and viewing of CD content. If the start screen does not appear, locate the file 'START_CD.bat' using Explorer and double click to start.

VM9-WinPCL4-Autorun.tif
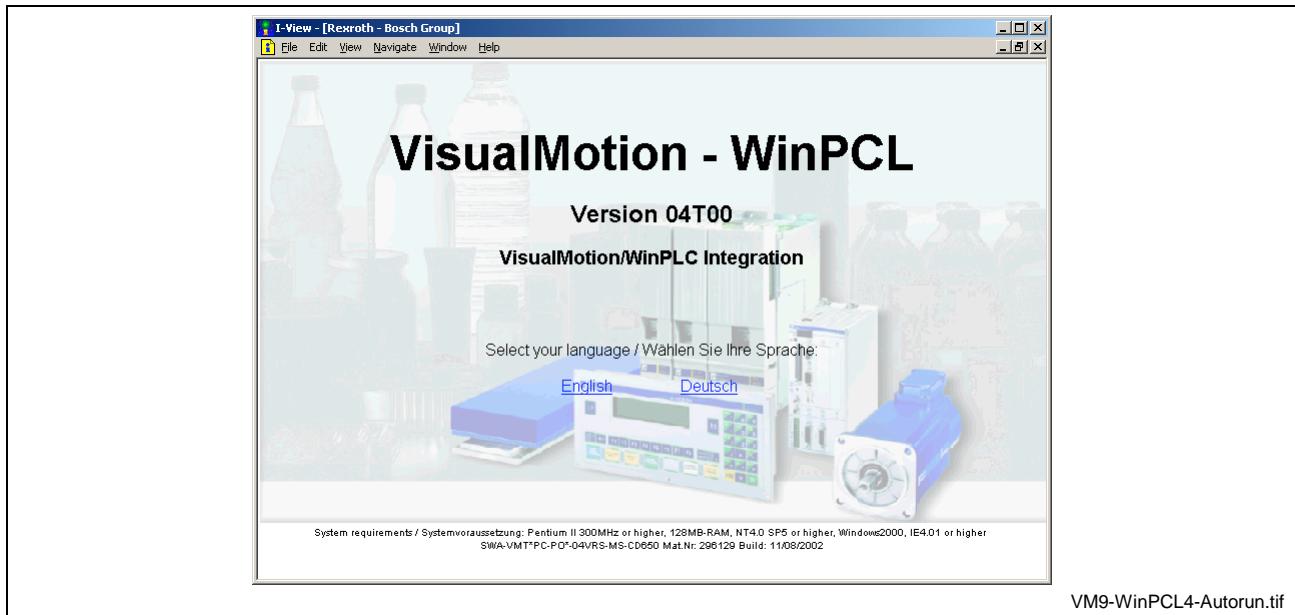
Fig. 2-1: Start Screen

After selecting your preferred language, information about the contents (software and documentation) of the CD is provided. The documentation available in the CD is stored in PDF format. The viewing of PDF files requires that an Acrobat Reader (provided in the CD) be installed.

VM9-WinPCL4-Install-Select.tif
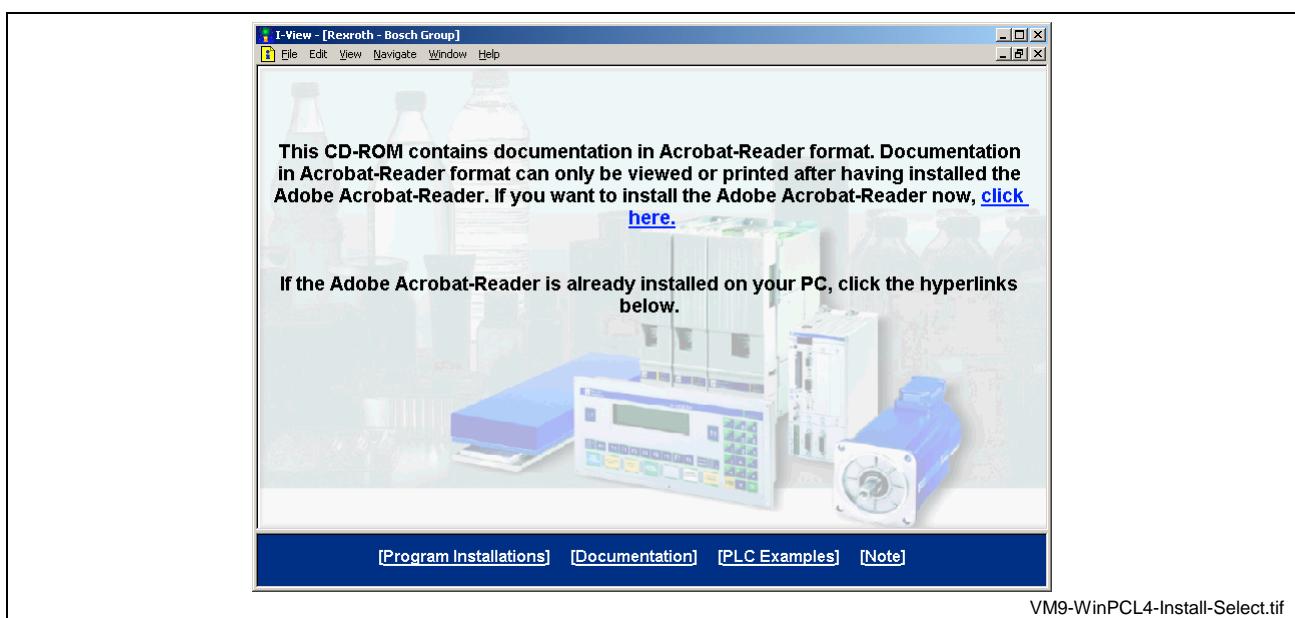
Fig. 2-2: Prerequisites for Using the Documentation

An overview of the available programs on the CD can be displayed by clicking the **Program Installations** link in the footer.

VM9-WinPCL4 Programs.tif
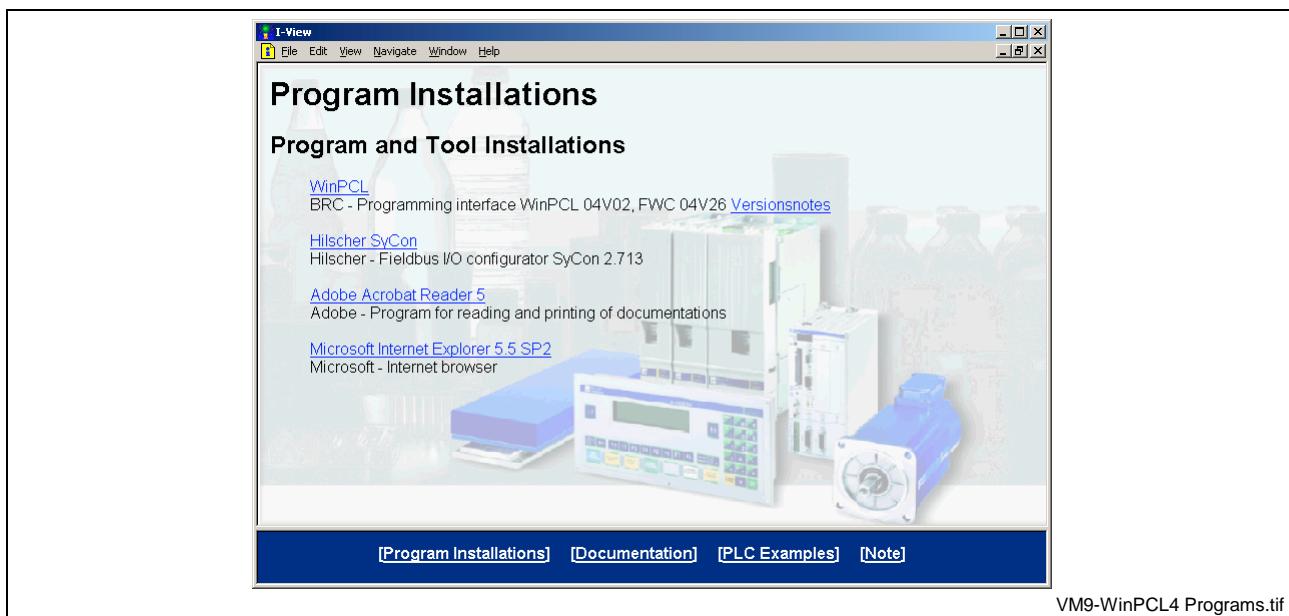
Fig. 2-3: Program Overview on this CD

Select the **WinPCL** link to unpack the necessary files for installing WinPCL version 4.

VM9-WinPCL4-Install-Note.tif
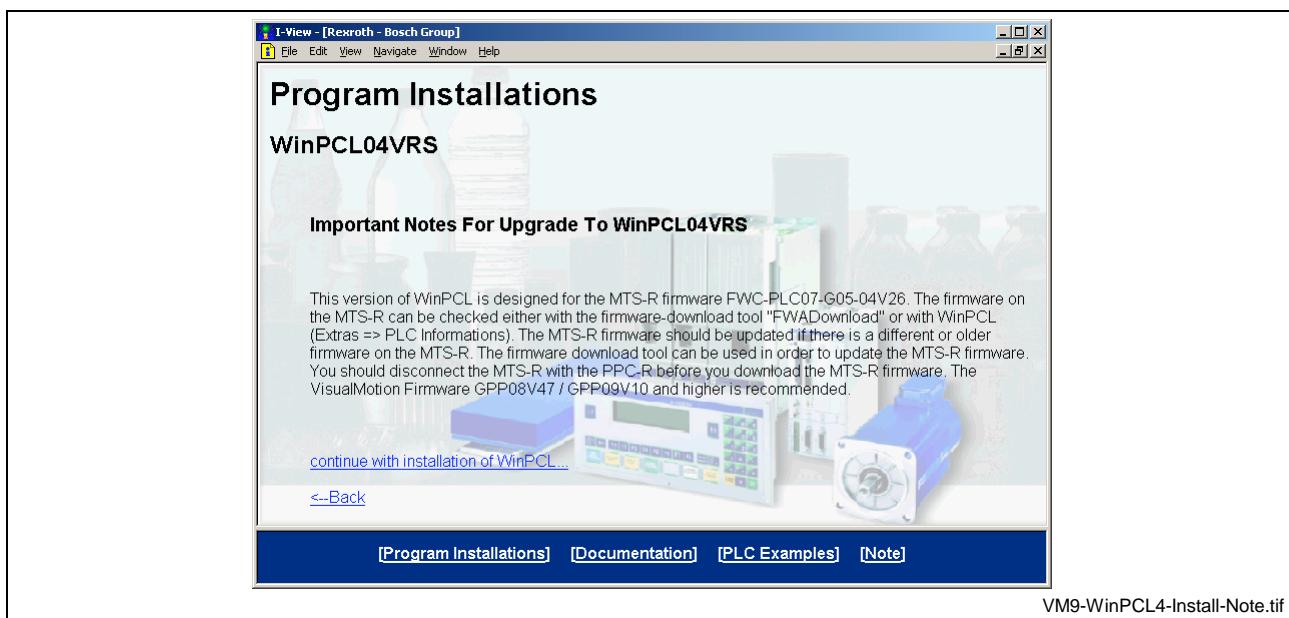
Fig. 2-4: Program Installation Note

SYNAX - ISP CD - Programs WinPCL Extract.bmp
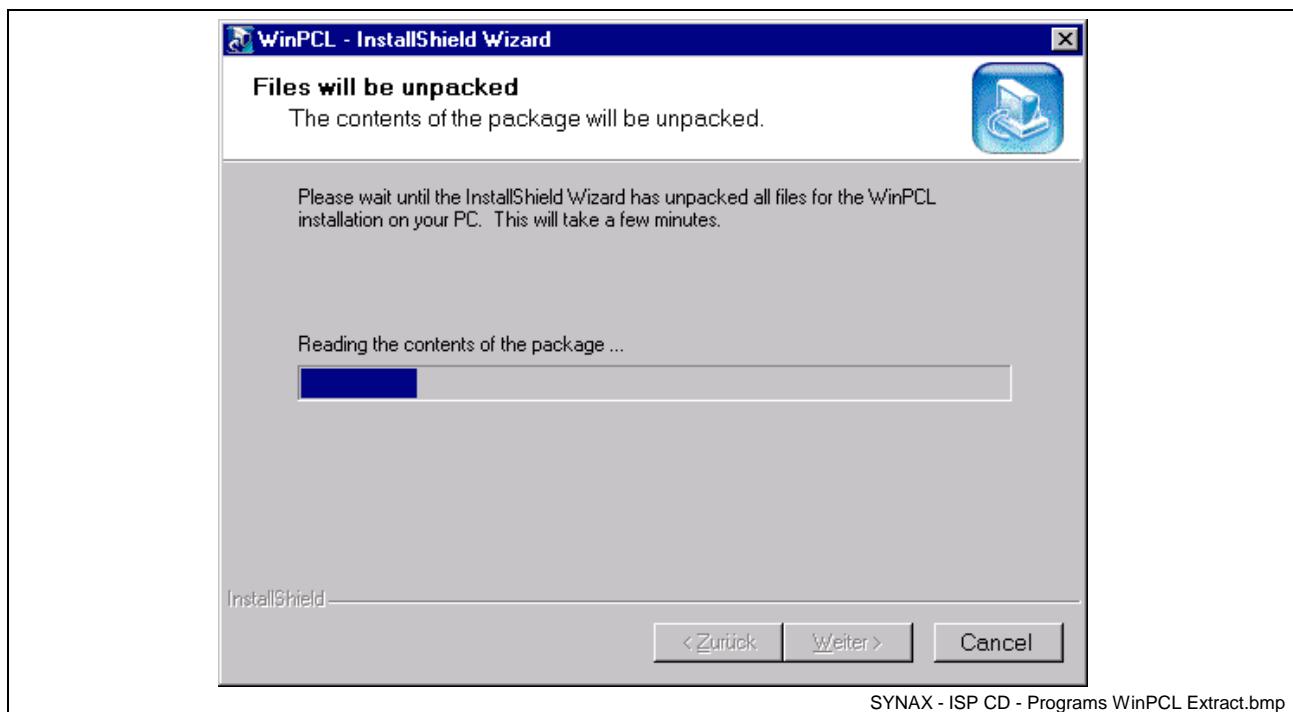
Fig. 2-5: Unpack the Installation Files - WinPCL

The WinPCL installation setup file can be directly accessed by browsing the CD for the Setup.exe file (..\Program\WinPCL\Setup.exe) using Windows Explorer.

Once the WinPCL InstallShield Wizard unpacks the necessary files, select the initial language to install the software.

The first window informs you about the installed program and the language of the installation.

WinPCL Setup - Info - 1.tif
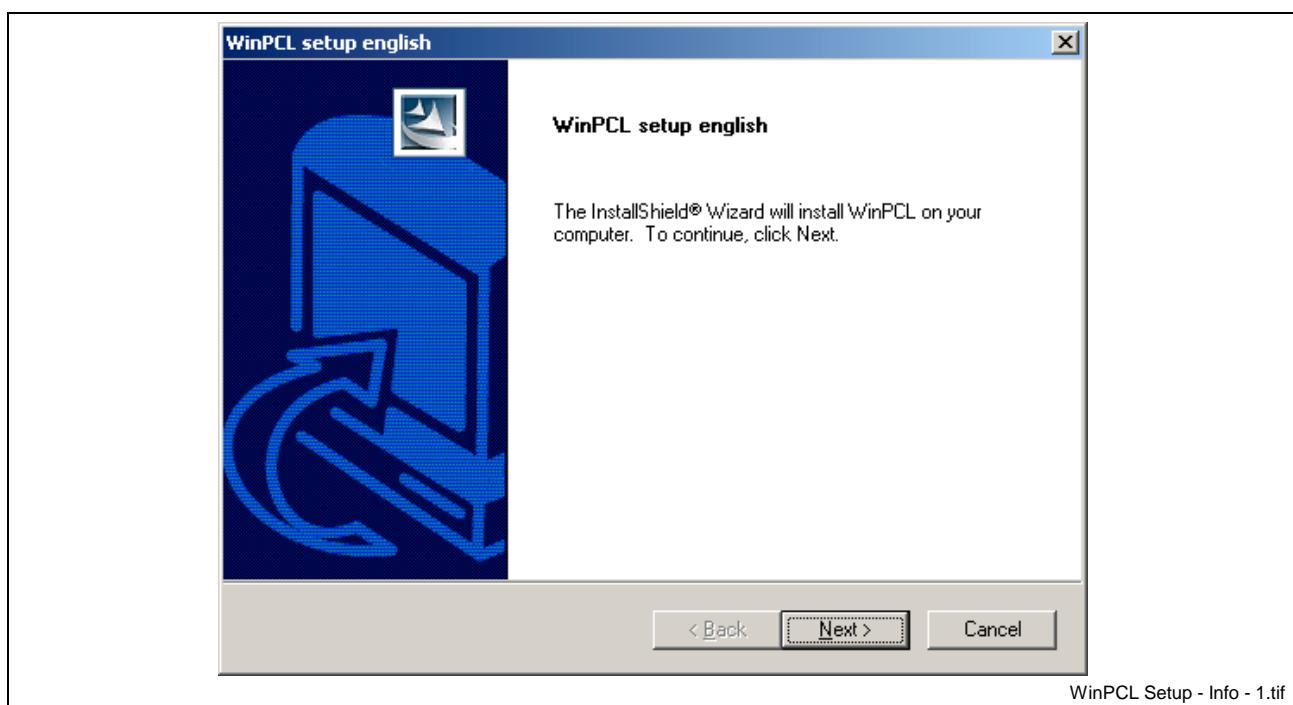
Fig. 2-6: Installation Information

In the second window, select the destination folder for creating the required directory structure.

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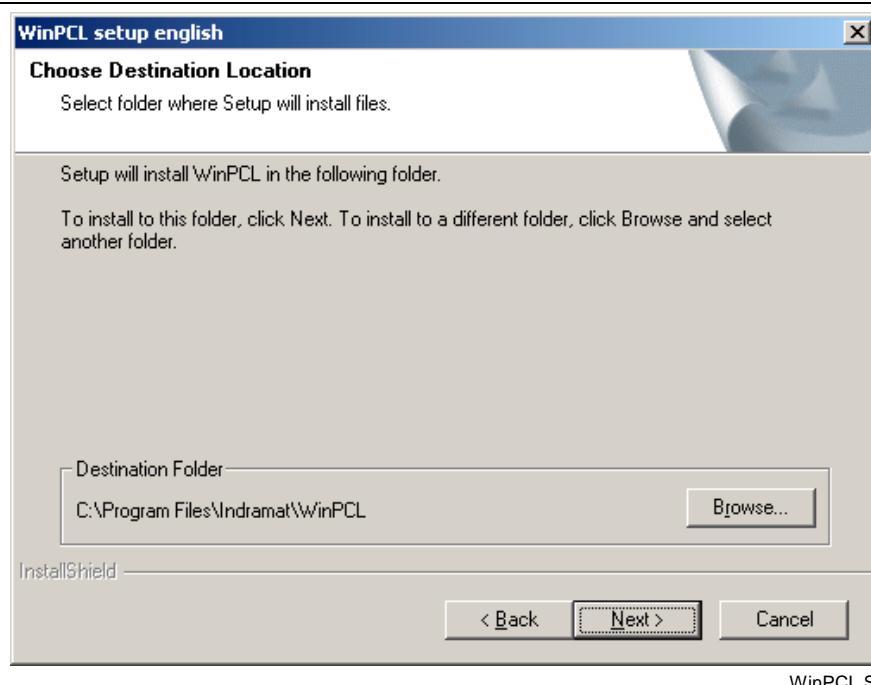
WinPCL Setup - Select folder - 2.tif

Fig. 2-7: Destination Folder Selection

The next window allows the selection of the program folder name that will be used to launch the different WinPCL programs from the Desktop Start menu. This program folder will be visible to all users registered on your PC.
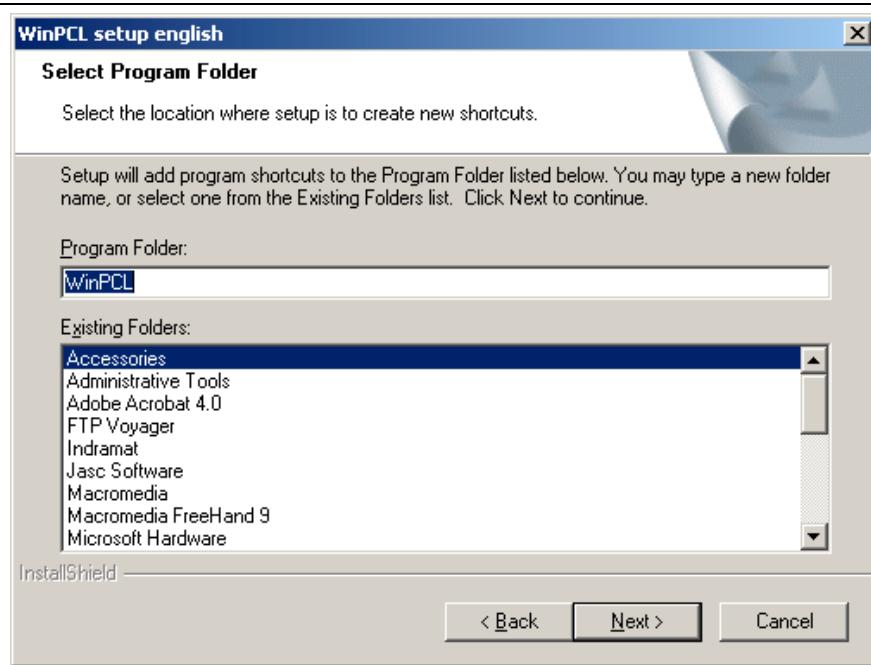
WinPCL Setup - Select program folder - 3.tif

Fig. 2-8: Selection of the Program Folder

In the last window, select all the WinPCL components before copying the files to your PC. The destination folder can still be changed before copying the files.

WinPCL Setup - Select component - 4.tif
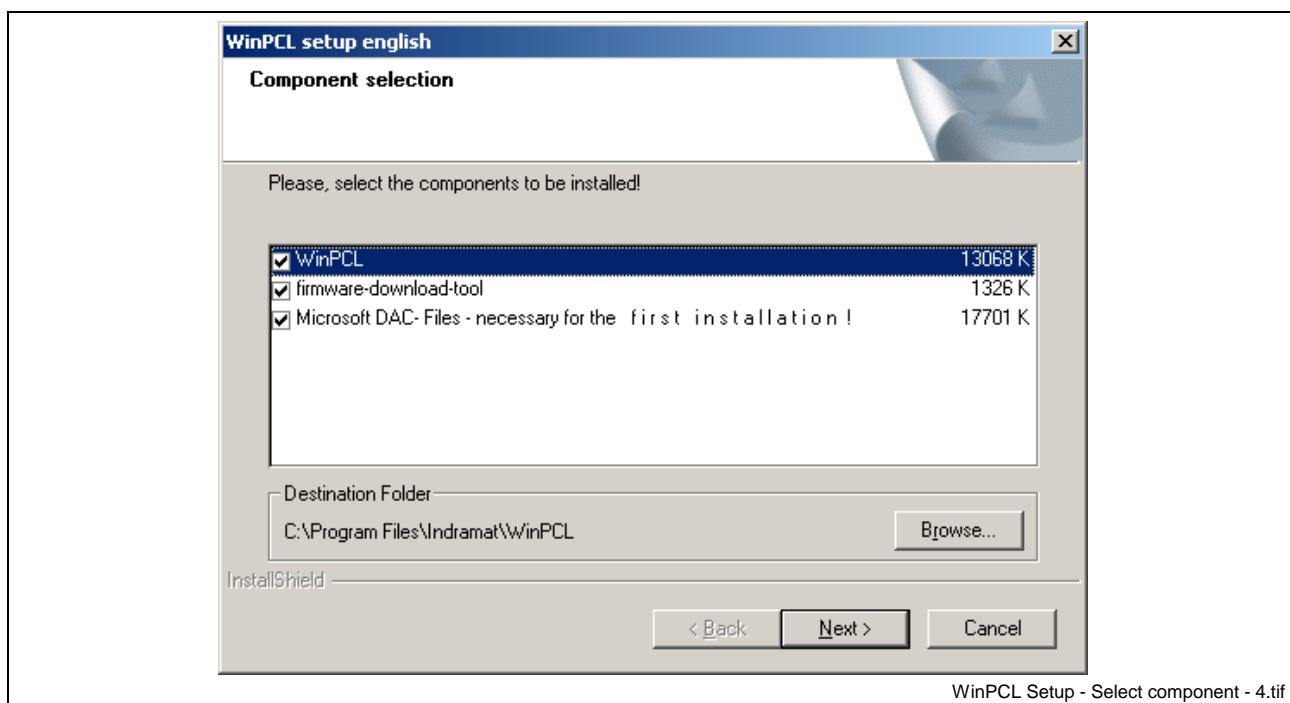
Fig. 2-9: Component Selection

After all files are copied and available to the operating system, the system must be "Rebooted". After rebooting, the necessary components for working with the "WinPCL" programming system are registered.

WinPCL Setup - Restart - 5.bmp
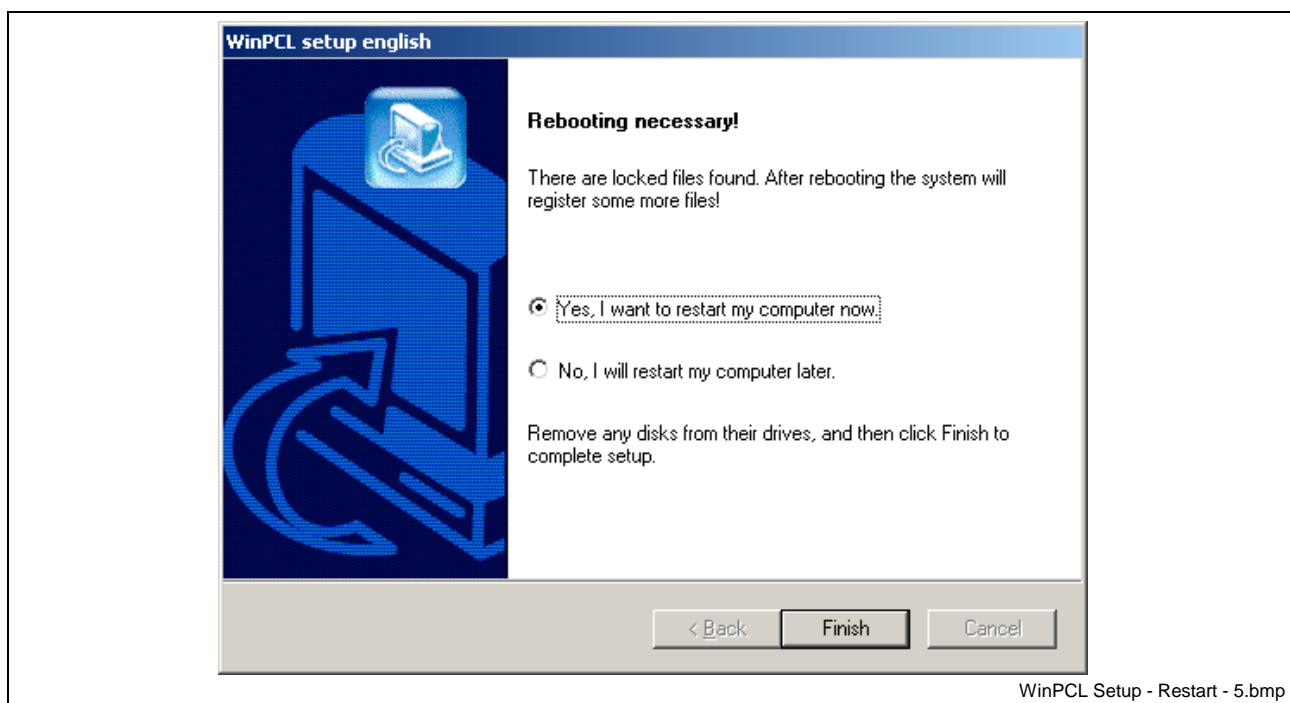
Fig. 2-10: Rebooting the System

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2.2 Program Overview

The installation adds the following links in the selected program group:

- FWA-Download
- KillTask
- SysCon
- UserManager
- WinPCL
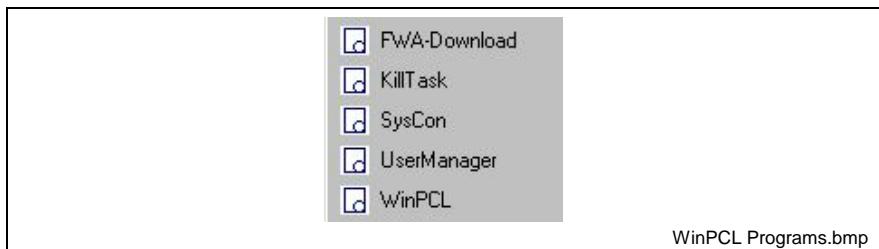
Fig. 2-11: Installed Programs

Note: In order to define the control system for programming using WinPCL, the programs must be called up for the first time in the following sequence.

- User manager (UserManager)
- System configurator (SysCon)
- Load firmware (FWA-Download)

After that WinPCL can be started.

KillTask Program

Program KillTask can be used for ending the communication process (function interface) and the applied applications (WinPCL). If the program (process) KillTask is started, all applied programs (processes) at the function interface are reported to a scheduling event. Afterwards, they log off and end their application.

WinPCL Program

The "WinPCL" program is used for programming the Bosch Rexroth PLC.
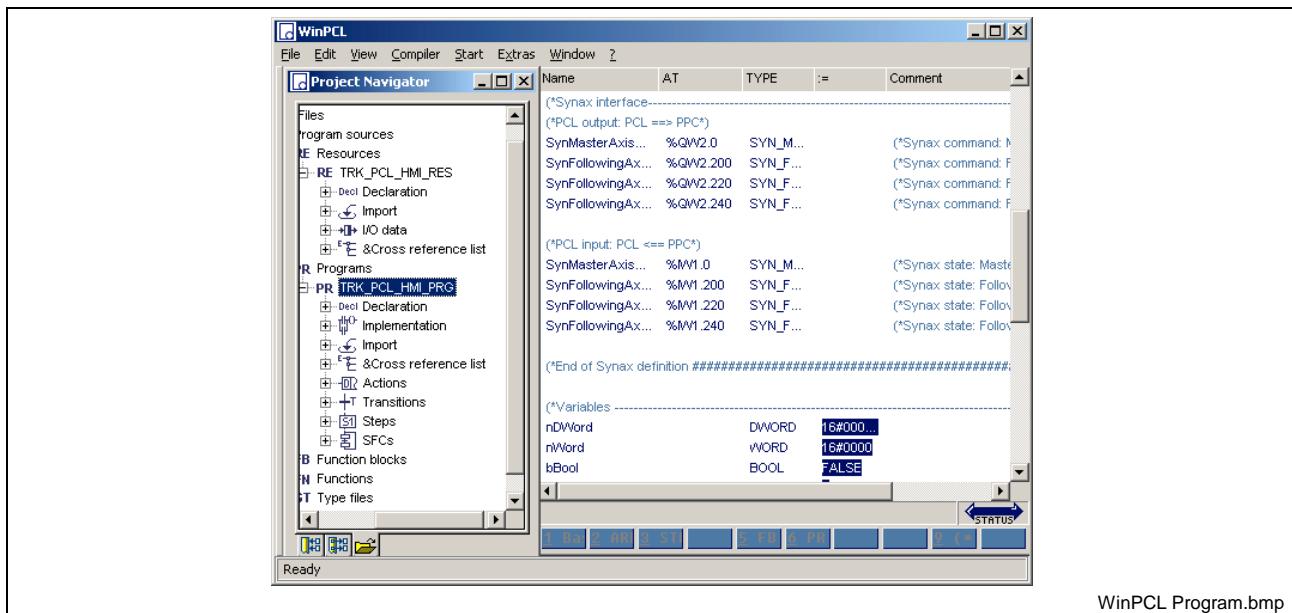
WinPCL Program.bmp

Fig. 2-12: Program "WinPCL"

2.3   User Manager

The User Manager is used to create and assign rights to users of the WinPCL programming system on the PC. It ensures that only individuals with configured rights have access to protected functions (or parts of program). The user must login to the User Manager in order to gain access to protected functions. A user name and password is required. After a successful login, the User Manager determines, based on user rights, if the selected function can be executed.
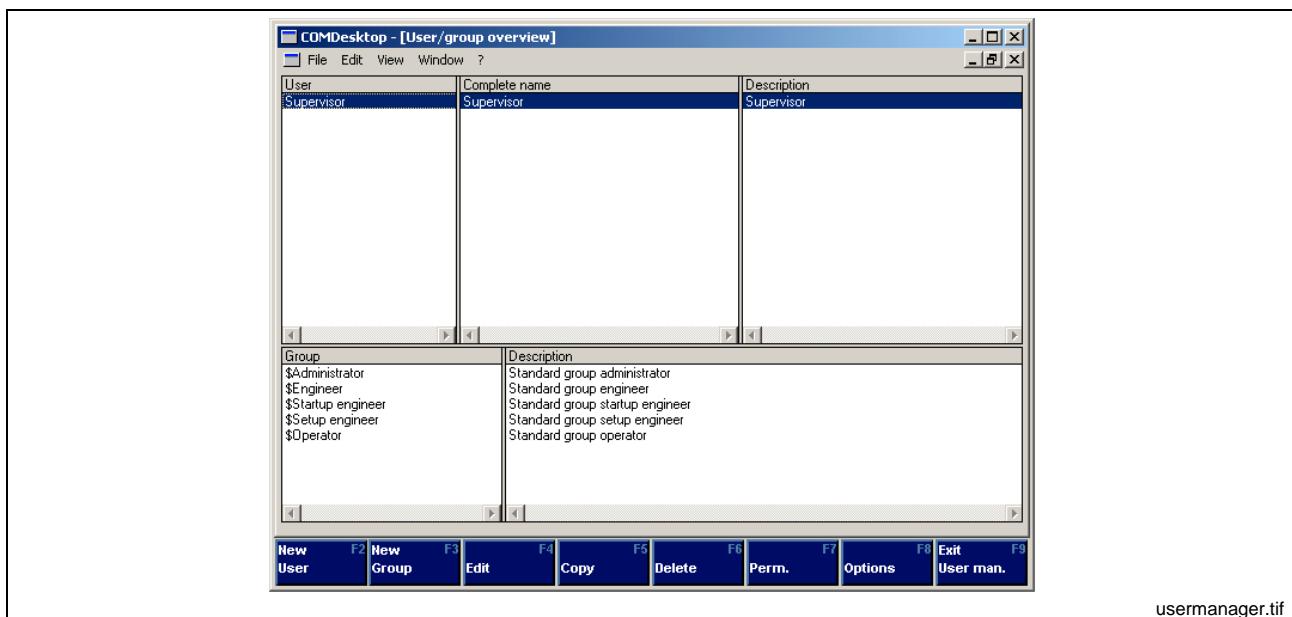
usermanager.tif

Fig. 2-13: User Manager

Once the User Manager starts, all entered users and groups are displayed. Additional new users and groups can be created or changed. Changing configurations in the User Manager requires a valid name and password. **If the User Manager is started for the first time, the user can log on with the name "Supervisor" and the password "123".** To ensure that not every user gets full access to the programming system

with the name "Supervisor", the password should be changed and a new user should be entered with specific rights.

Menu Buttons

Enter new user: Click the **New User** button or press the **F2** key to add a new user to the User Manager.

Enter new group: Click the **New Group** button or press the **F3** key to add a new group to the User Manager.

Note: All actions described in the following section refers to the user or group selected in the list.

Edit user or group: The property of a group or user is changed by selecting the item and clicking the **Edit** button or pressing the **F4** key.

Copy user or group: A user or group configuration (rights and options) is copied by selecting the item and clicking the **Copy** button or pressing the **F5** key. The user or group name and properties must be re-entered.

Clear user or group: A user or group is deleted by selecting the item and clicking the **Delete** button or pressing the **F6** key.

Assign rights for user or group: User rights are assigned and/or changed for a user or group by selecting the item and clicking the **Permission** button or pressing the **F7** key.

Assign options for user or group: User or group options are changed by selecting the item and clicking the **Options** button or pressing the **F8** key.

Exit User Manager: The User Manager can be closed by clicking the **Exit** button, pressing the **F9** key or be selecting **File ⇒ Exit** from the main menu.

New User – F3

Clicking the **New User** button or pressing the **F2** key opens the Edit User window.

WinPCL UserManager - New User.tif
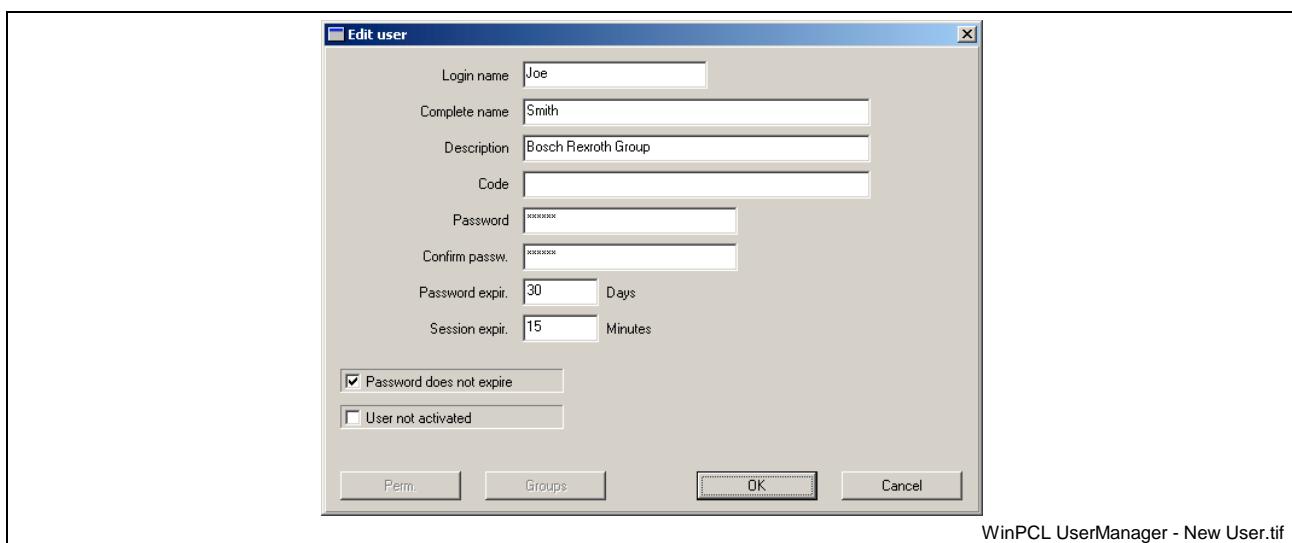
Fig. 2-14: Input a New User

Once a new user is created and the window is closed, using the **OK** button, the user data can be modified by selecting the user name and clicking the **Edit** button.

Note: The **Permission** and **Groups** buttons are available when a user is being edited.

Permission – F7

WinPCL rights are assigned to a user by selecting the user's name and clicking on the **Permission (Perm.)** button.

WinPCL UserManager - User rights.tif
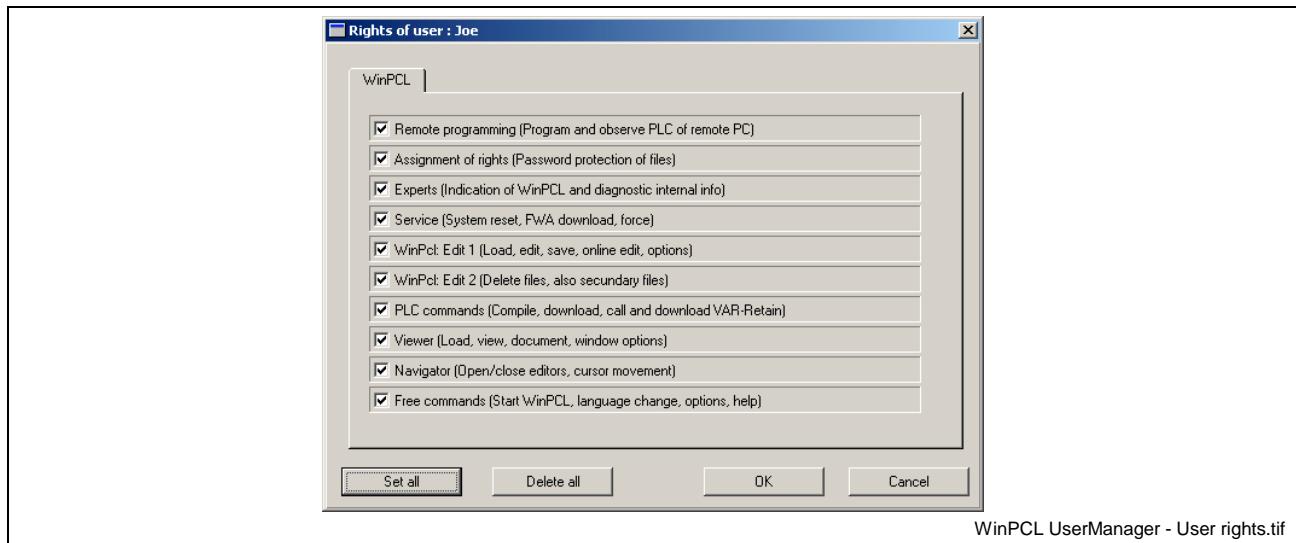
Fig. 2-15: Assign User Rights

New Group – F3

Enter a name and description for the group. Users are added to a group by selecting the user's name from the **Not members** section and moving it to the **Members** section. Add rights to a group by clicking the **Permission** button.

WinPCL UserManager - User group.tif
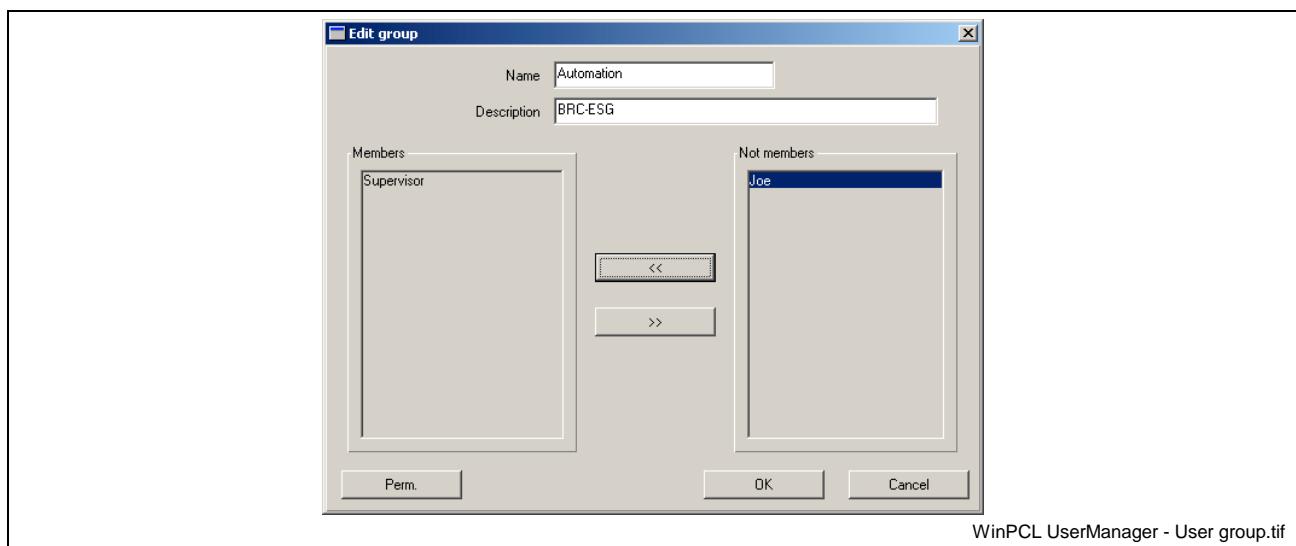
Fig. 2-16: Assign a User to a Group

Note: Existing groups in the main menu can be modified by clicking the **Edit** button or assigned rights by clicking the **Perm** button.

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Rights are assigned by selecting the appropriate checkbox and clicking the **OK** button. Depending on the installed application, the number of rights that are available for assignment is different. User rights are assigned to the application that means that if several applications were installed, each application has its own property side with respective rights.
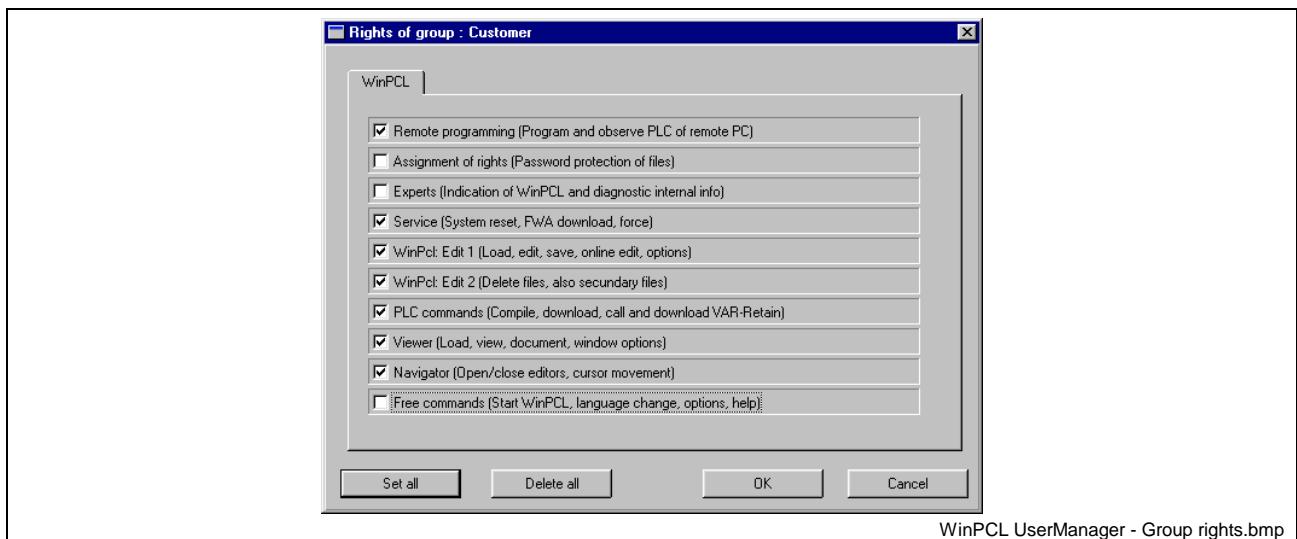
Fig. 2-17: Assign Rights for the Group

System Configuration

The system configurator (SysCon) is used to configure the communication settings between the host computer and the MTS-R. Use the following steps to establish initial communication with the MTS-R.

Note: At this point, the MTS-R has been interfaced with the PPC-R by means of the SUP local bus board and installed in a RMB rack. Refer to the VisualMotion 9 Project Planning manual, for proper supply voltage to each device.

1. Connect the Bosch Rexroth IKB0005 ready-made cable between the MTS-R (X10) and the PC's COM port.

2. From the desktop toolbar, select **Start ⇒ Programs ⇒ WinPCL ⇒ SysCon** to launch the System Configuration window.

3. Add a control by selecting **Edit ⇒ New Device** or by double clicking on the System Configuration tree icon.

4. Select ISP200-R-G2 from the Device Type drop-down list and press the **Next>** button. The designation "-R" or "-P" ("-R" for RECO; "-P" for PC) specifies the type of the control device.
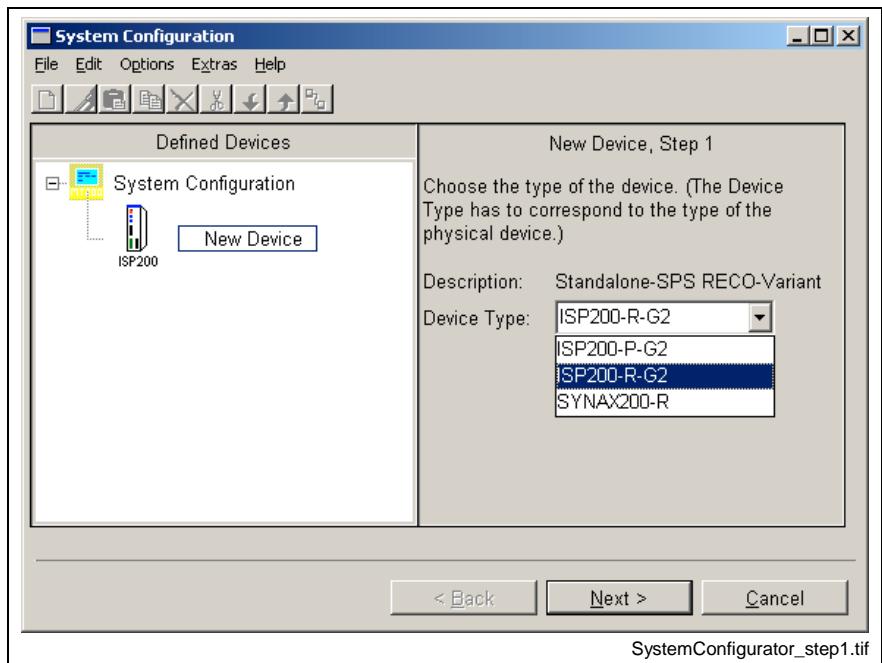
Fig. 2-18: Device Type Selection

5. Set the device address for the MTS-R to match the rotary switches located above the X10 connector of the MTS-R. Refer to Fig. 2-23 for an illustration.

Note: The address is selected by either double clicking on the number or by using the keyboard arrow keys and pressing Enter.
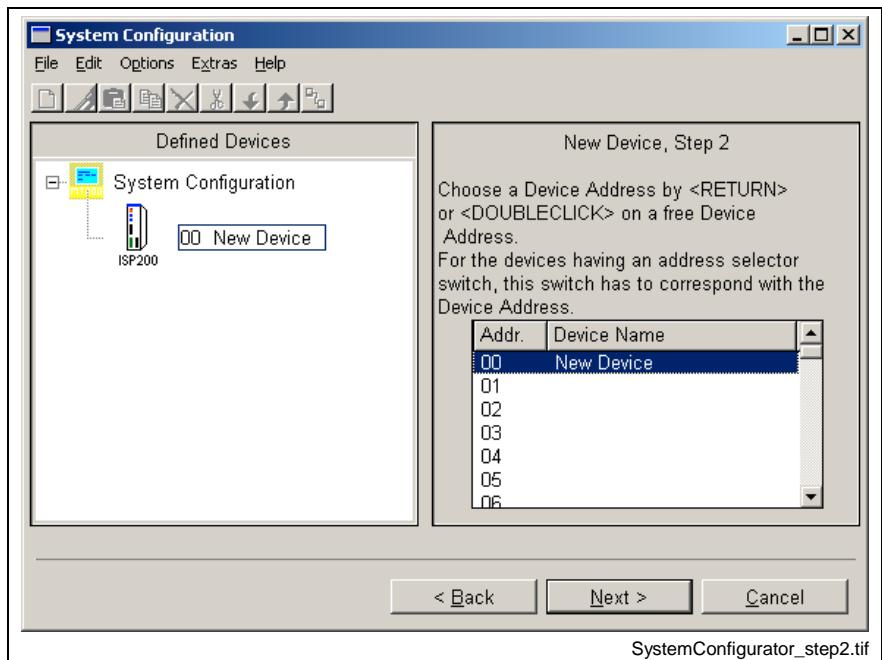
Fig. 2-19: Device Address Selection

6. Edit the Device name and set the Device Status radio button to either "On" of "Off". When set to "On", the MTS-R must be powered and connected to the PC when running WinPCL. Setting the Device Status to "Off" allows the user to work offline without the system issuing communication errors.

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SystemConfigurator_step3.tif
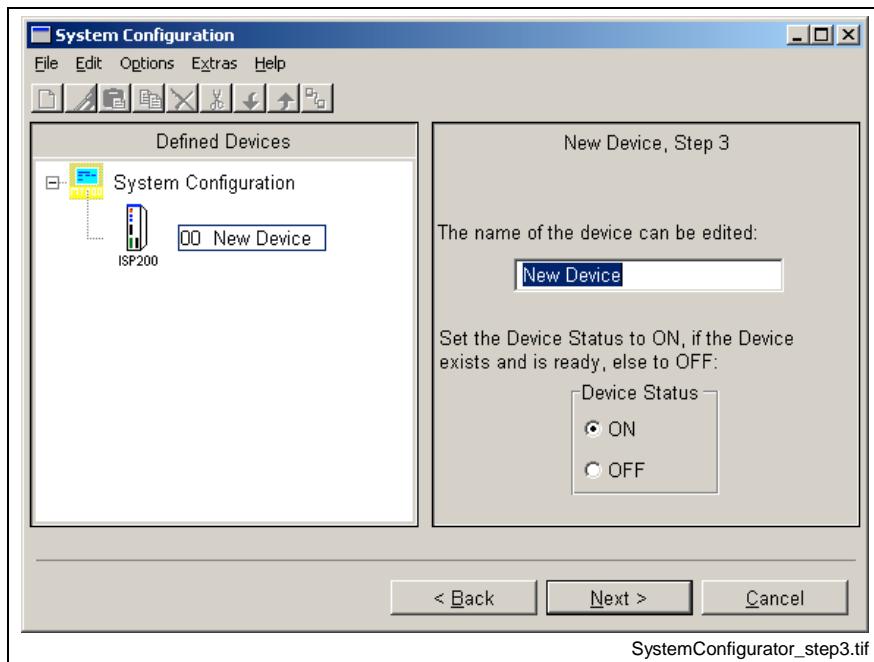
Fig. 2-20: Device Name and Status

7. Select the component types that are connected together. Currently, the only option is **MTS-R-M1/NONE**.

SystemConfigurator_step4.tif
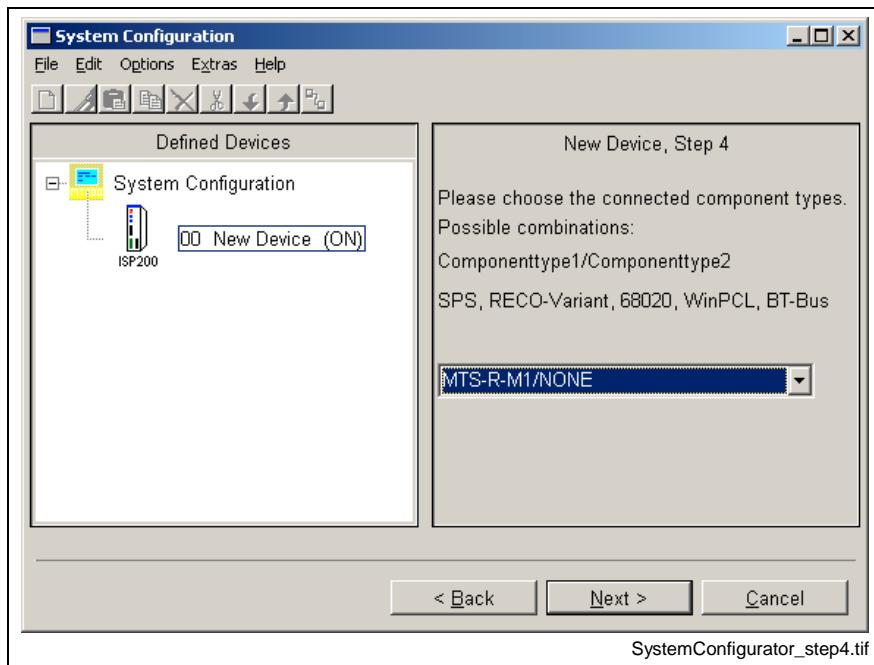
Fig. 2-21: Component Type Selection

8. **Configure Communication Port**:

    a.) Select the "new" communication address name or create a new entry by double clicking on "new" or by selecting the New Communication Address icon (🗋).

    b.) Set the following communication settings and press the **Finish** button:

    −   Select the Channel: This selection refers to the PC's COM port connected to the IKB0005 ready-made cable.

– **Select the Mode**: This selection refers to the communication type (RS-232, RS-422 or RS-485).

– **Select the Baud Rate**: This selection refers to the MTS-R DIP switch baud rate setting.

– **Select the Parity**: This selection refers to the MTS-R DIP switch parity setting. (Normally set to NONE)
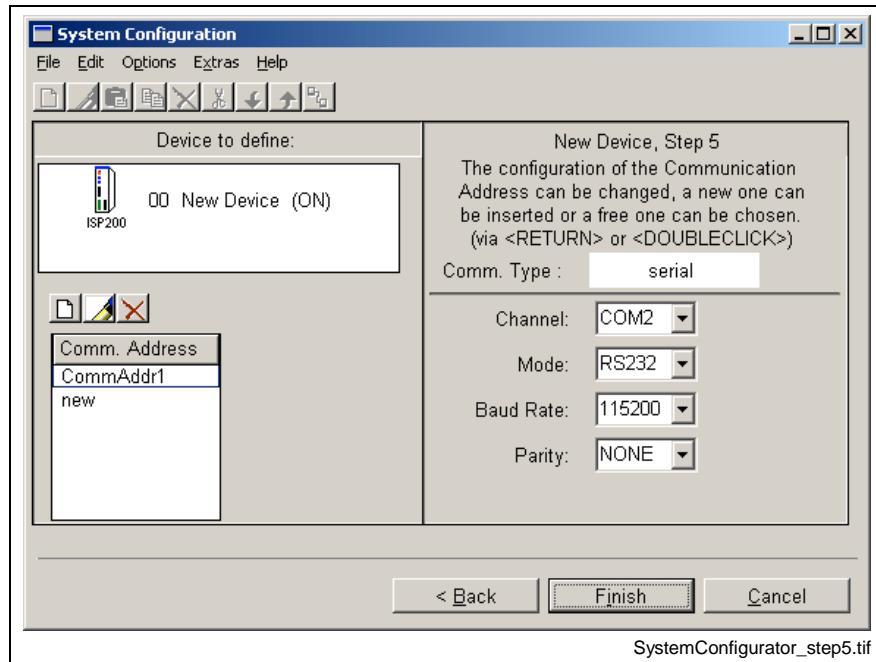
Fig. 2-22: Device Communication Selection

Refer to the following figure and table for proper setting of the MTS-R baud rate switch.
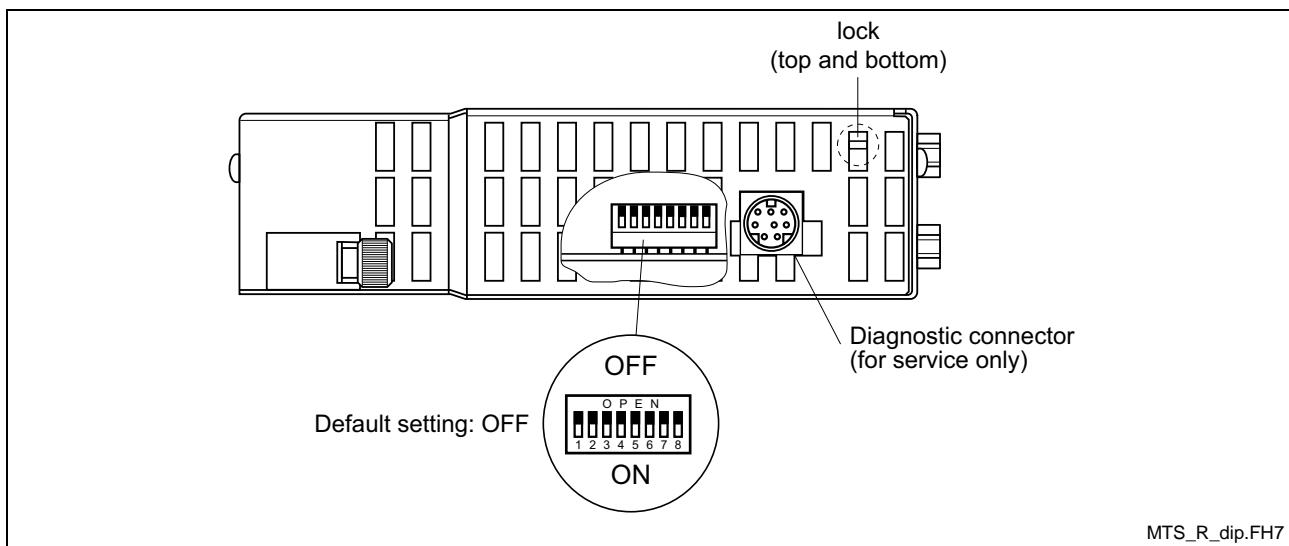
Fig. 2-23: DIP Switch setting for PROG Port X10

The table below shows the possible settings and the related DIP switch configurations.

		Switch Position						
Setting	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Baud rate 9600	ON	ON	ON	X	X	X	X	X
Baud rate 19200	OFF	OFF	OFF	X	X	X	X	X
Baud rate 38400	ON	OFF	OFF	X	X	X	X	X
Baud rate 57600	OFF	ON	OFF	X	X	X	X	X
Baud rate 115200	ON	ON	OFF	X	X	X	X	X
No parity	X	X	X	OFF	X	X	X	X
Even parity	X	X	X	ON	X	X	X	X
RS 232	X	X	X	X	OFF	OFF	X	X
RS 485	X	X	X	X	ON	OFF	X	X
RS 422	X	X	X	X	OFF	ON	X	X
Boot lock OFF	X	X	X	X	X	X	X	OFF
Boot lock ON	X	X	X	X	X	X	X	ON
X = the position of this switch is not important.								

Table 2-1: Setting the X10 port for MTS-R01.2 and MTS-R02.2

The final window displays an overview of the device data configured. Press the **Exit** button and save the configuration.

SystemConfigurator_Finalstep.tif
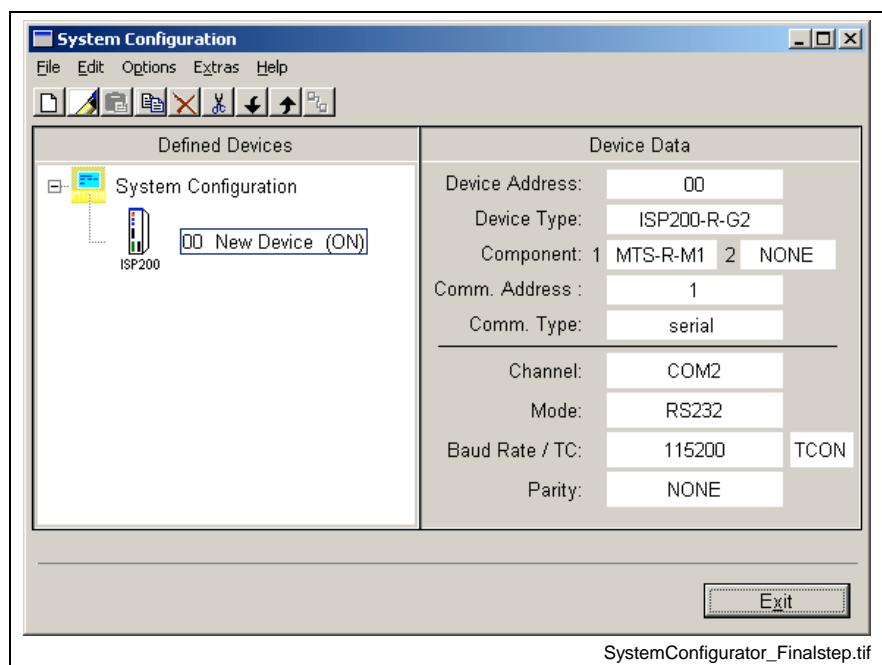
Fig. 2-24: Configured Device Data

The configuration of devices and the handling of the system configurator is described in detail in the application description, "System configurator V21" DOK-CONTRL-SYS*SER*V21-AW01-EN-P provided in the WinPCL CD.

Device Type ISP200-R-G2

Device type "ISP200-R-G2" refers to the MTS-R hardware that can be addressed with different communication interfaces (RS232 / RS485 / RS422). Due to the many possibilities for the configuration settings, the following information describe the required settings and restrictions that exist depending on the properties of device type and system configurator.

The following table describes the default settings on the MTS-R at delivery. All switch positions are set to "OFF".

Setting	Value	Configuration
Device address	0	rotary switch (front side of the device)
Mode	RS232	DIP switch: 5 – 6 (upside of device)
Baudrate	19200	DIP switch: 1 – 3 (upside of device)
Parity	NONE	DIP switch: 4 (upside of device)

Table 2-2: MTS-R basic settings

The description of the MTS-R can be found in the project planning manual, "RECO-SPS ISP200-R" DOK-CONTRL-MTS*R0*.2**-PR01-EN-P provided in the WinPCL CD.

RS232 interface

Settings in the System Configurator

Device type: "ISP200-R-G2" (ISP RECO)

Device address: "00" to "63"

The MTS-R can be addressed with the device addresses "00" to "63" via RS232.

The configuration permits the allocation of a device address only once.

Device name: The device name is freely selectable. However, it should be selected according to the machine data.

Device state: "ON"

At the start of the application, the initialization of the control device is executed and communication is established. If no control device is connected, set this option to "OFF".

Component types: "MTS-R-M1/NONE"

The "ISP200-R-G2" control system only contains the component 'MTS-R-M1' (ISP RECO). "NONE" means that no requests are transmitted via the PLC to a second control, e.g., PPC.

Communication address: An existing communication address can be selected, unless used by other control devices. Typically, a new communication address must be generated.

Interface (channel): Selection of the PC interface for "RS232". The 'ISP200-R-G2' is connected via a serial interface cable.

Mode: "RS232"

Baudrate: "9600, **19200**, 38400, 57600, 115200"

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Parity:	"**NONE**/EVEN"

Settings on the MTS-R

Device address:	"00" to "63"
	The MTS-R can be addressed with device addresses "00" to "63" via RS232.
	The adjusted device address must agree with the address selected in the system configurator.
Interface (channel):	Communication to the MTS-R is performed with a connection to X10 located on the front side of the device.
Mode:	"RS232"
Baudrate:	"19200"
Parity:	"**NONE**/EVEN"
Ready-made cable:	• IKB0005 [15 pin D-sub (MTS-R) to 9 pin D-sub (PC COM Port)]
	• IKB0012 [15 pin D-sub (MTS-R) to 9 pin D-sub (PC COM Port)]
	(9 pin D-Sub on IKB0012 is a straight connector housing)

RS485 Interface

Settings in the System Configurator

Device type:	"ISP200-R-G2" (ISP RECO)
Device address:	"00" to "63"
	The function interface can be addressed with device addresses "00" to "63" via RS485.
	The configuration permits the allocation of a device address only once.
Device name:	The device name is freely selectable. It should be selected according to the machine data.
Device state:	"ON"
	At the start of the application, the initialization of the control device is executed and communication is established. If no control device is connected, set this option to "OFF".
Component types:	"MTS-R-M1/NONE"
	The "ISP200-R-G2" control system only contains the component 'MTS-R-M1' (ISP RECO). "NONE" means that no requests are transmitted via the PLC to a second control, e.g., PPC.
Communication address:	An existing communication address can be selected if a "RS485" configuration is available. Otherwise, a new communication address must be generated.
Interface (channel):	Selection of the PC interface for "RS485". The 'ISP200-R-G2' is connected via serial interface cable.
Mode:	"RS485"
Baudrate:	"19200"

Parity: "**NONE**/EVEN"

Settings on the MTS-R

Device address: The MTS-R can be addressed with device addresses "00" to "63" via RS485.

The adjusted device address must agree with the address selected in the system configurator.

Interface (channel): The communication to the MTS-R is performed with a connection to X10 located on the front of the device.

Mode: "RS485"

Baudrate: "19200"

Parity: "**NONE**/EVEN"

Ready-made cable:
- IKB0017 [15 pin D-sub (MTS-R) to 15 pin D-sub]
- IKB0019 [15 pin D-sub (MTS-R) to terminal strip]

Note: If the "ISP200-R-G2" is connected to the same RS485 bus as the "SYNAX200-R", then the parity of the ISP must be set to "EVEN". The parity on the "SYNAX200-R" is fixed.

RS422 Interface

Settings in the System Configurator

Device type: "ISP200-R-G2" (ISP RECO)

Device address: "00" to "63"

The MTS-R can be addressed with the device addresses "00" to "63" via RS422.

The configuration permits the allocation of a device address only once.

Device name: The device name is freely selectable. However, it should be selected according to the machine data.

Device state: "ON"

At the start of the application, the initialization of the control device is executed and communication is established. If no control device is connected, set this option to "OFF".

Component types: "MTS-R-M1/NONE"

The "ISP200-R-G2" control system only contains the component 'MTS-R-M1' (ISP RECO). "NONE" means that no requests are transmitted via the PLC to a second control, e.g., PPC.

Communication address: An existing communication address can be selected, unless used by other control devices. Typically, a new communication address must be generated.

Interface (channel): Selection of the PC interface for "RS422". The 'ISP200-R-G2' is connected via serial interface cable.

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Mode:	"RS422"
Baudrate:	"19200"
Parity:	"**NONE**/EVEN"

Settings on the MTS-R

Device address: The MTS-R can be addresses with the device addresses "00" to "63" via RS422.

The adjusted device address must agree with the address selected in the system configurator.

Interface (channel): The communication to the MTS-R is performed with a connection to X10 located on the front of the device.

Mode: "RS422"

Baudrate: "19200"

Parity: "**NONE**/EVEN"

Ready-made cable:
- IKB0015 [15 pin D-sub (MTS-R) to 15 pin D-sub]
- IKB0016 [15 pin D-sub (MTS-R) to 9 pin D-sub]

2.4 PLC Firmware Download Tool

To start the FWA-Download program, select **Start ⇒ Programs ⇒ FWA-Download** from the Window's desktop toolbar. The *FWA-Download* window is used to download firmware to the MTS-R. Make sure that the firmware version you download matches the WinPCL version. If you are using WinPCL version 4, the PLC firmware should indicate version 4 in the description, i.e., PLC07S-G05-**04**V26.

WinPCL FWA Download - Basic.tif
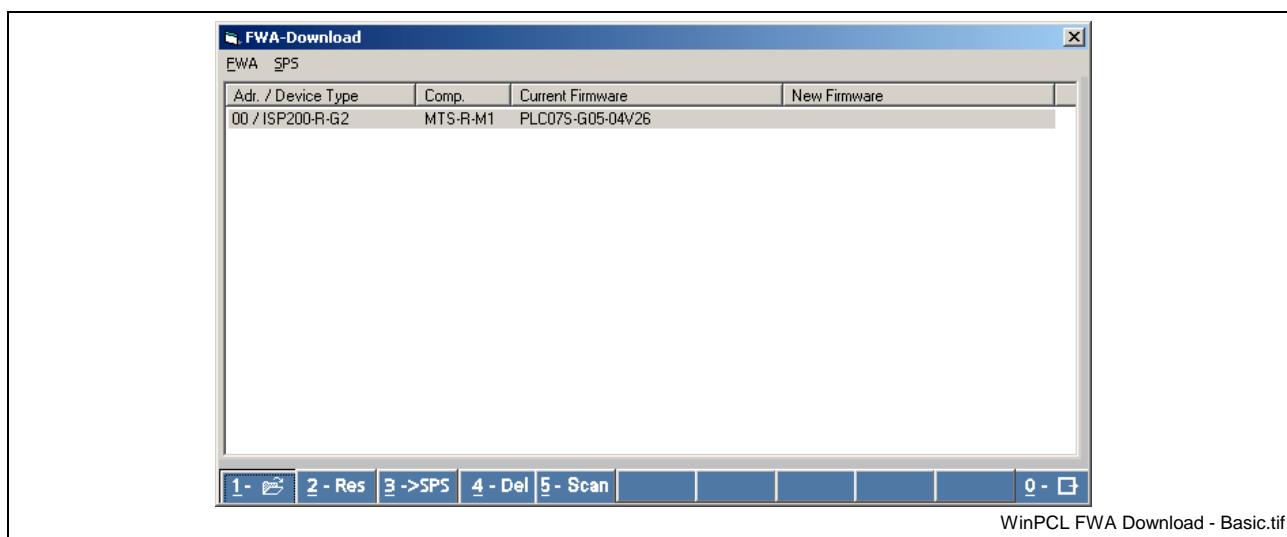
Fig. 2-25: Firmware Download

Menu

All the commands described in the following section affect to the selected control device in the list.

Select FWA: A firmware file can be selected by pressing the Alt + 1 keyboard keys or by menu selection *FWA* ⇒ *Select*. The selectable firmware files are displayed in the dialog corresponding to the device configuration.

Clear selection FWA: If a wrong version of firmware was selected, the selection can be cancelled by pressing the Alt + 2 keyboard keys or by menu selection *FWA* ⇒ *Reset Selection*.

Download FWA: The selected firmware can be loaded to the control by pressing Alt + 3 keyboard keys or by menu selection *PLC* ⇒ *Start Download*.

Clear PLC program memory: The PLC's program memory can be cleared by pressing the Alt + 4 keyboard keys or by menu selection *PLC* ⇒ *Delete RAM.* It must be ensured that a PLC program is available to transmit to the control.

Terminate application: The application can be terminated with by pressing the Alt + 0 keyboard keys or by menu selection *FWA* ⇒ *End*.

Note: The commands described in this section can affect the user program memory. Make sure that a backup file exists before performing any of the commands mentioned above.

With loading the PLC firmware, the preparations are terminated. Programming the PLC program can be started.

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3 Communication Channels

3.1 Dual Port RAM

The Dual Port RAM (DPR) memory, shared by the MTS-R and VisualMotion, is structured into the following areas:

- Cyclic channel
- Register channel
- Non-cyclic channel
- Status channel

Cyclic Channel

The cyclic channel is used to cyclically transfer the following data between the MTS-R and VisualMotion at a rate of 8ms for GPP8 and 4ms for GPP9.

- Integers   (Program and Global)
- Floats   (Program and Global)
- Control parameters (Binary or Hex)
- Task Parameters   (Binary or Hex)
- Axis Parameters   (Binary or Hex)

Note: Drive parameters ("S" or "P") cannot be transmitted cyclically because of the inherent delay of parameter access over the SERCOS service channel. However, if a drive parameter is mapped to an Axis Parameter, that Axis parameter can be used in cyclic data (see description of Axis Parameters A-0-0180 - A-0-0196 in the *VisualMotion 9 Functional Description*).

The cyclic channel has a limited size:

- GPP8 = 40 words (e.g. 20 floats) in one direction
- GPP9 = 64 words (e.g. 32 floats) in one direction

The content of the cyclic channel has to be configured using VisualMotion's Fieldbus Mapper.

The cyclic channel provides data consistency over the whole data range. VisualMotion supports the Multiplex feature of the cyclic channel for GPP9 firmware. Function blocks for the Multiplex feature are available for the PLC.

The PLC can directly access the cyclic channel via the following PLC I/O addresses:

	Start Address (byte)	End Address (byte)	Length (byte)
PLC Output **Cyclic Channel**	1024	1103 (GPP8) 1151 (GPP9)	80 (GPP8) 128 (GPP9)
PLC Input **Cyclic Channel**	3840	3919 (GPP8) 3967 (GPP9)	80 (GPP8) 128 (GPP9)

Table 3-1: Accessible Cyclic Channel of the DPR

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Register Channel

The register channel is used to cyclically transfer I/O data (VisualMotion register) between the PLC and VisualMotion at the set I/O Mapper rate (2 or 4ms).

The register channel is limited to 128 registers (256 bytes) in one direction.

The content of the register channel is configured with the following VisualMotion parameters:

- C-0-2641 'PLC Input Register List'
- C-0-2642 'PLC Output Register List'

Example:

C-0-2641 'PLC Input Register List' = 500, 501 and 502

Registers 500, 501 and 502 are copied from the GPP firmware to the register channel.

The register channel is word consistent.

The PLC can directly access the register channel via the following PLC I/O addresses:

	Start Address (byte)	End Address (byte)	Length (byte)
PLC Output Reg. Channel	0	255	256
PLC Input Reg. Channel	2816	3071	256

Table 3-2: Accessible Register Channel of the DPR

Non Cyclic Channel

The PLC can send telegrams via this channel and short format 3 and access VisualMotion data. Function blocks that can access this channel are available and described in chapter 4.

Status Channel

Status information of the PLC and VisualMotion is available via the status channel. The status channel is a predefined sector of the DPR where the PLC and VisualMotion exchange status information cyclically. The user may access some of this information using function blocks. Refer to chapter 4 for details.

3.2 MTS-R and Local RECO

Communication between the MTS-R and Local RECO I/O is performed cyclically using the Input and Output memory areas of the DPR.

RECO Register Channel Memory Area

The RECO memory area is used to cyclically transmit local RECO I/O data between the MTS-R and RECO02 modules.

The maximum bytes available for Local RECO02 is based on the 4 RMB rack maximum configuration. Each RMB rack can hold 4 RECO02 I/O modules. If the first RMB rack is using a MTR-R01.2/PPC-R01.2 system,

then only 2 slots are available for RECO02 I/O in the first RMB rack. If 4 RMB racks are used, then 14 RECO02 I/O modules can be installed and configured. If each RECO I/O module requires 4 bytes (32-bit version), then a maximum of 56 bytes can be addressed in DPR for Local RECO I/O modules.

RECO DPR Memory Structure		Start Address (Byte)	End Address (Byte)	Max. Length (Bytes)
Output Memory Area	Local RECO **Register**	0	55*	56
Input Memory Area	Local RECO **Register**	4	59	56

Table 3-3: DPR Structure for Communication for MTS-R and Local RECO
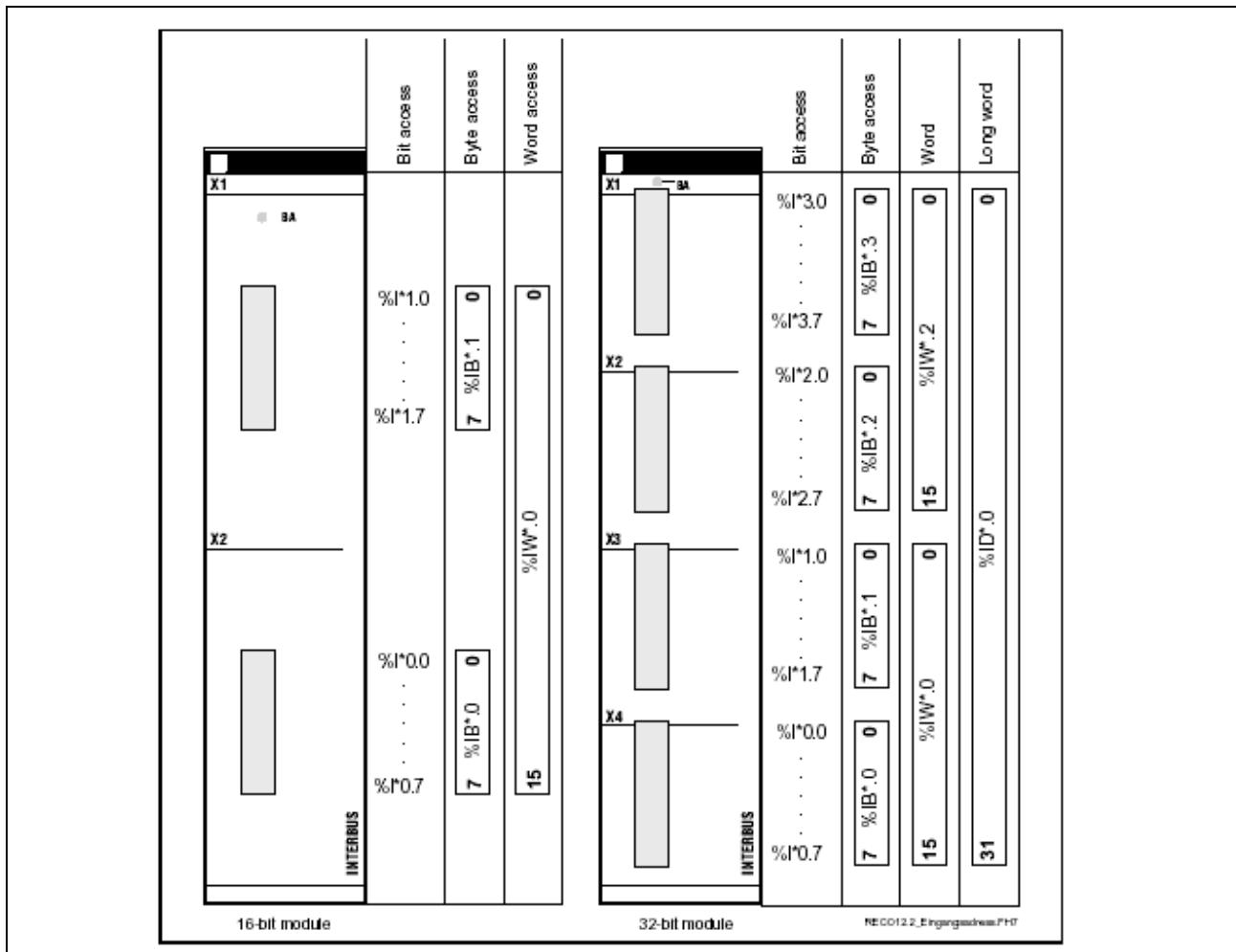
Fig. 3-1: RECO I/O Module Bit, Byte and Word Layout

Local RECO Input Address (%I)		Logical Data Mapped to Register Input Address		
		Log No.	from	to
Byte 1	2816.0	1	0.0	0.7
Byte 2	2817.0	1	1.0	1.7
Byte 3	2818.0	1	2.0	2.7
Byte 4	2819.0	1	3.0	3.7
and so on….				

Table 3-4: Physical Address to Logical Data Relationship

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3.3　System Initialization

Once the MTS-R and PPC-R are connected and installed in a RMB rack, the individual units must be initialized before communication can be established across the DPR. An IKB0005 cable (RS-232 serial interface) is used to connect to each unit's X10 connection. Refer to the *VisualMotion 9 Project Planning* manual for details.

VisualMotion (PPC-R)

The local DPR memory used for communication between the MTS-R and VisualMotion (PPC-R) must be initialized. This is accomplished by using VisualMotion's Fieldbus Mapper as follows:

1. Connect the IKB0005 serial interface cable to the PPC-R (X10) and the PC's COM port.
2. Establish communication with the control, launch VisualMotion Toolkit and select **Commission ⇒ Fieldbus Mapper.**
3. Create a new Fieldbus Mapper selecting *Bosch Rexroth ISP200 Interface* and turn the ISP interface on.
4. Synchronize your Project with the control.
5. Cycle power to the control.
6. The ISP Interface is enabled and VisualMotion can now initialize the PLC.
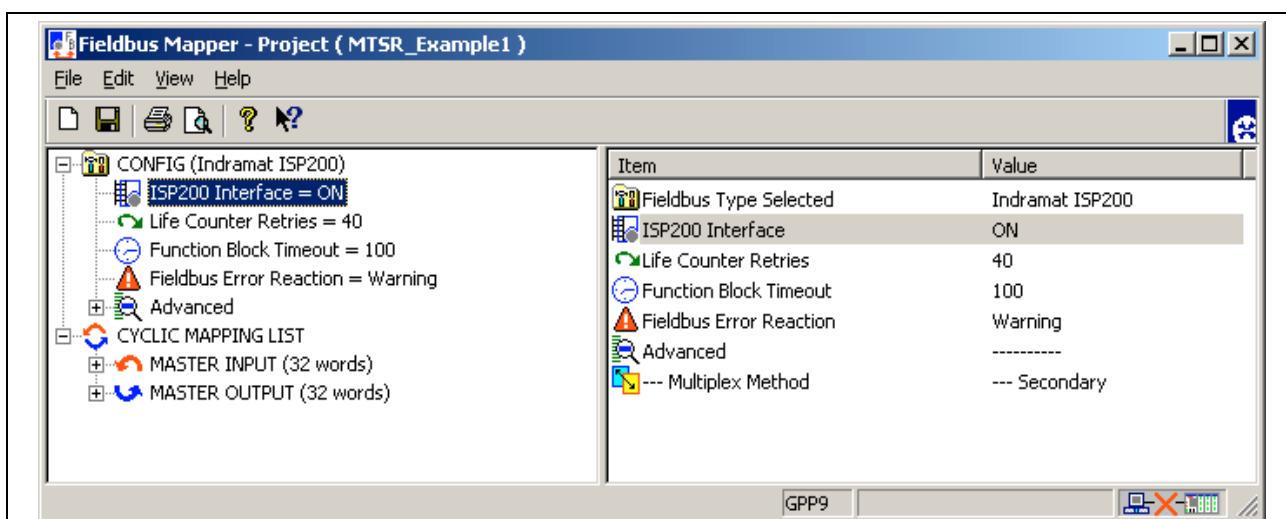
Fig. 3-2: Setup of the ISP200 Interface with the Fieldbus Mapper

ISP200 (MTS-R PLC)

Communication between the MTS-R and VisualMotion is automatically enabled with the download and activation of a WinPCL resource and program. The WinPCL resource must have a VisualMotion connection type memory area addressed in the I/O Editor. The WinPCL program must contain at least one variable cyclically mapped to the VisualMotion memory area in DPR.

4 WinPCL Functions and Function Blocks

4.1 ISP200 and VisualMotion Interface Functions

Special functions (FN) and function blocks (FB) for the ISP200 (PLC) are available and provide an improved interface to the VisualMotion control. These functions and function blocks are mainly designed to support the non-cyclic communication between the ISP200 and motion control. Refer to Importing WinPCL Function Blocks for details on how to import the functions and function blocks into your PLC project.

The following functions are available for the ISP200 and VisualMotion interface:

Functions	Description	S#ErrorType
MC_CONVERT_TO_IDENT_NO	This function converts an input IDENT_CODE (e.g. 91) to an SERCOS parameter string (e.g. S-0-0091)	--
MC_CONCAT_TO_IDENT_NO	This function links together the inputs of single parameter elements (e.g. C, 0, 125) to a single string (e.g. C-0-0125)	--
CHSPPARA	This FN takes a formatted input string (e.g. C-0-0125), and converts it into the VisualMotion parameter/variable number and type format.	250

Table 4-1: VisualMotion and ISP Functions

MC_CONVERT_TO_IDENT_NO

When using the function MC_CONVERT_TO_IDENT_NO, a SERCOS or coded parameter ident number (e.g. 91) is converted to a parameter ident number string.

The output MC_CONVERT_TO_IDENT_NO can be directly connected to the input IDENT_NO of a motion control function block. Thus, the function allows for reading or writing of all valid parameters of a drive by means of the parameter list S-0-0017 (IDN list of all operating data, WORD list).

Fig. 4-1: MC_CONVERT_TO_IDENT_NO Function

Input / Output Variables

The following tables describe the input/output variables used in the MC_CONVERT_TO_IDENT_NO function.

Input/ Output variables	Description
IDENT_CODE	SERCOS or coded parameter ident number (e.g., 91)
MC_CONVERT_TO_IDENT_NO	Parameter ident number string of the form `X-Y-ZZZZ´ (e.g., `S-0-0091´)

Table 4-2: MC_CONVERT_TO_IDENT_NO Input/Output Variables

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Function Description

The DWORD connected at the input IDENT_CODE is continually converted in the corresponding parameter ident number string according to SERCOS standard and is filed on the output MC_CONVERT_TO_IDENT_NO.

The most significant byte of the input IDENT_CODE is not evaluated; accordingly, it is not represented in Fig. 4-2.
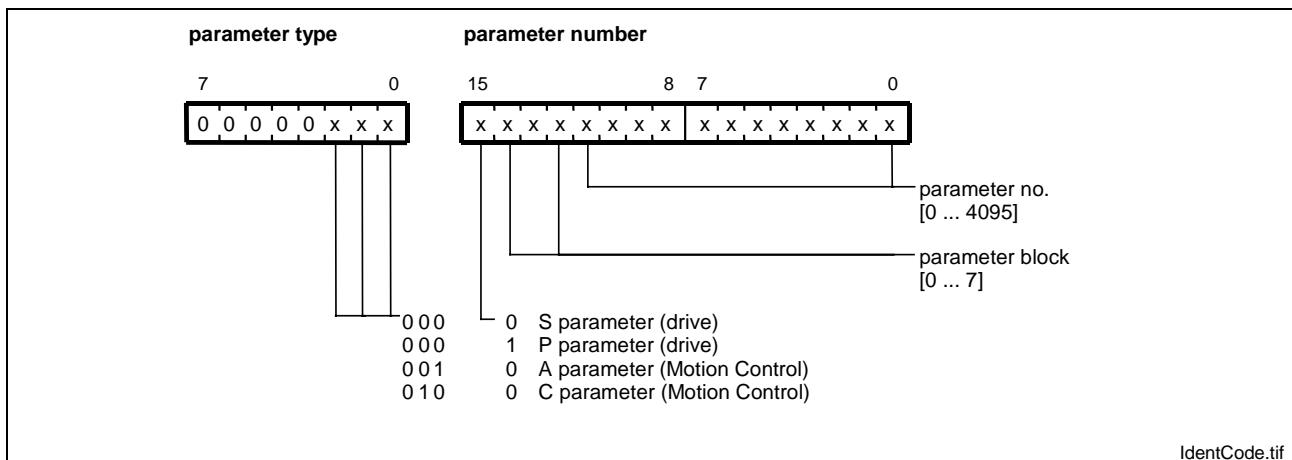
Fig. 4-2: Structure of input IDENT_CODE

Errors Handling

The function MC_CONVERT_TO_IDENT_NO does not generate errors. If the input variable cannot be converted in whole or in parts, the non-convertible parts are replaced by the sign(s) "#"".

System variable	Value	Description
S#ErrorFlg	FALSE	
S#ErrorTyp	0	
S#ErrorNr	0	

Table 4-3: Error codes MC_CONVERT_TO_IDENT_NO

MC_CONCAT_TO_IDENT_NO

When using the function MC_CONCAT_TO_IDENT_NO, single elements of a parameter ident number string are concatenated (linked together) to a parameter ident number string.

The output MC_CONCAT_TO_IDENT_NO can be directly connected to the input IDENT_NO of a motion control function block. For example, by means of this function all parameter ident number strings of one type and set can be created through a counter at the input PARAMETER_NO.
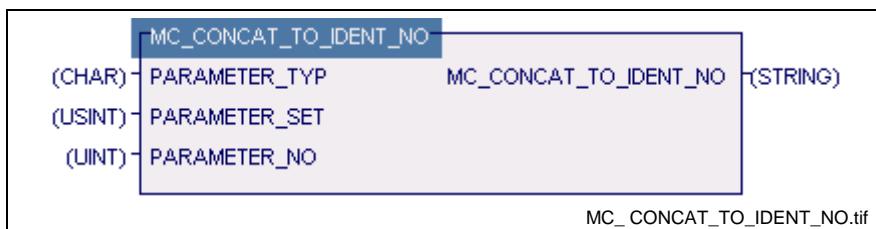
Fig. 4-3: MC_CONCAT_TO_IDENT_NO Function

Input / Output Variables

The following tables describe the input/output variables used in the MC_CONCAT_TO_IDENT_NO function.

Input/ Output Variables	Description
PARAMETER_TYP	Parameter type according to SERCOS or Indramat standard (permissible in upper or lower case letters): `S`, `P`, `A`, `C`, `Y`, `R`, `I`, `G`, `H`, `T´, `F´)
PARAMETER_SET	Parameter set according to SERCOS standard (permitted: 0...7)
PARAMETER_NO	Parameter number according to SERCOS standard (permitted: 0...4095)
MC_CONCAT_TO_IDENT_NO	Parameter ident number string of the form `X-Y-ZZZZ´ (e.g.: `S-0-0001´)

Table 4-4: MC_CONCAT_TO_IDENT_NO Input/Output Variables

Function Description

The variables connected at the inputs PARAMETER_TYP, PARAMETER_SET and PARAMETER_NO are combined continually to the corresponding parameter ident number-string according to SERCOS standard and are filed on the output MC_CONCAT_TO_IDENT_NO.

Error Handling

The function MC_CONCAT_TO_IDENT_NO does not generate errors. If one or several input variable cannot be converted, the non-convertible parts are replaced by the sign(s) ""#"".

System Variable	Value	Description
S#ErrorFlg	FALSE	
S#ErrorTyp	0	
S#ErrorNr	0	

Table 4-5: Error codes MC_CONCAT_TO_IDENT_NO

CHSPPARA

This function takes a formatted input string, and converts it into the VisualMotion parameter/variable number and type.
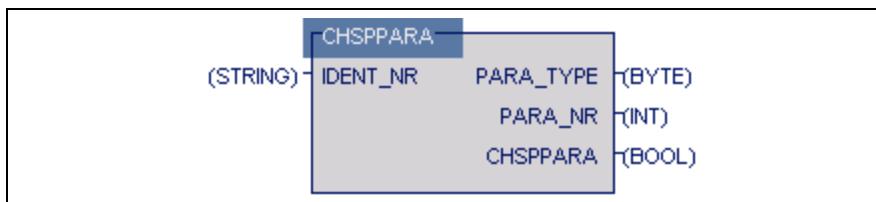
Fig. 4-4: CHAPPARA Function

Input / Output Variables

The following tables describe the input and output variables used in the CHAPPARA function.

Input	Type	Description
IDENT_NR	STRING	String name for a VisualMotion parameter, variable or register. Formatting example: C-0-0003 or c3 (not case sensitive)

Table 4-6: CHAPPARA Input Variable

Output	Type	Description
PARA_TYPE	BYTE	Type of parameter, variable or register requested (ASCII). Example: 43 (ASCII value for C in Hexadecimal)
PARA_NR	INT	Number of the parameter, variable or register requested. Example: 3
CHSPPARA	BOOL	Flag set if input error is found.

Table 4-7: CHAPPARA Output Variables

Function Description

CHSPPARA converts an input string into the VisualMotion parameter/register/variable type and number to be used internally for other ISP200 function blocks for non-cyclic communication to VisualMotion. The valid data format for IDENT_NR is shown in the following tables:

Data Type*	Description
C	Control parameter
T	Task parameter
A	Axis parameter
S	SERCOS standard parameter
P	SERCOS product specific parameter
R	VisualMotion register
G	VisualMotion global integer
H	VisualMotion global float
I	VisualMotion program integer
F	VisualMotion program float
* Data type is not case sensitive.	

Table 4-8: CHAPPARA Data Types

Input String	Short form	Description
C-0-0125	c125	VisualMotion parameter format (Leading 0 is optional on the parameter number. Maximum string length of 8 characters.)
r-0-500	R500	VisualMotion Register 500

Table 4-9: CHAPPARA Input String

CHSPPARA will then check the input string for the valid input formats and data types and then check the range of the parameter number depending

on the data type. The Boolean output CHSPPARA mirrors the S#ErrorFlg variable.

Error Handling

The CHSPPARA function can generate the following errors:

System Variable	Value	Description
S#ErrorFlg	TRUE	Error in Function
S#ErrorType	250	Identifies CHSPPARA
S#ErrorNr	1	Input data error
	6	Unexpected internal error

Table 4-10: CHSPPARA Error Handling

4.2   WinPCL Function Blocks for VisualMotion

Function blocks used for the ISP200 and VisualMotion interface will be described and grouped according to the following headings:

- Function Blocks for Non-Cyclic Communication
- Function Blocks for VisualMotion Diagnostics
- Function Blocks for Multiplexing (GPP9 only)

Function Block Overview

The following table briefly describes the function blocks used for the ISP200 and VisualMotion interface.

Function Block	Description	S#ErrorType
Function Blocks for Non-Cyclic Communication		
VM_RD_PARA	Reads 2-4 byte data (e.g. Floats, Integer, Parameter) from the motion control to the PLC. No list parameters are supported.	282
VM_WR_PARA	Writes 2-4 byte data (e.g. Floats, Integer, Parameter) from the PLC to the motion control. No list parameters are supported.	283
VM_RD_STRPARA	Reads any string data (e.g. drive names, diagnostics) from the motion control to the PLC. No list parameters are supported.	284
MC_RW_ARRAY_TLG	Send and receive of any telegram (272 bytes, array) to the motion control (e.g. subsequently added SIS services or ASCII protocol)	-309
Function Blocks for Motion Control Diagnostics		
MC_DIAGNOSIS	Read out of the diagnosis data of motion control	-285
MC_RD_PHASE	Reading of the SERCOS communication phase	-290
Function Blocks for Multiplexing (GPP9 only)		
PB_RD_MUX_DATA32	This FB can read multiplexed data from the motion control into the PLC. It support max. 16 multiplex levels and max. 25 multiplex words	--
PB_WR_MUX_DATA32	This FB can write multiplexed data from the PLC to the motion control. It support max. 16 multiplex levels and max. 25 multiplex words	--

Table 4-11: VisualMotion/ISP Function Blocks

Run-time Behavior

The function blocks used for non-cyclic communication between the ISP200 and VisualMotion are executed using an edge-triggered method.

For Example:

A revoked processing release (EXECUTE == FALSE) does not automatically result in the canceling of the function block.

The ACTIVE output signals the processing period of the function block, as long as the ACTIVE output was not assigned after processing release.

For Example:

The communication channel is busy - the processing release can be revoked at any time without execution of the function block.

The processing of the function block is completed when the DONE output is assigned.

Validity of the Output Data

The output data is only valid as long as the DONE output is assigned. The DONE output will remain assigned at least for one cycle, but only as long as the EXECUTE input is assigned. The ERROR_NO output is set back when the DONE output is set back. All other outputs remain unchanged.

No errors

The function block was not processed error-free when the DONE output is assigned and the ERROR_NO output is not equal to zero. In this case, any additional output data must not be evaluated, as they would not be adjusted in case of error.

Lock-out

Only one function block can access the non-cyclic channel of the Dual Port RAM at a time.

Task behavior

If during processing, a function block is interrupted by a higher priority task, it cannot release the assigned transmission channel. On re-initiation, the interrupted function block will resume its interrupted task in the place of interruption; it can release the transmission channel only after that time.
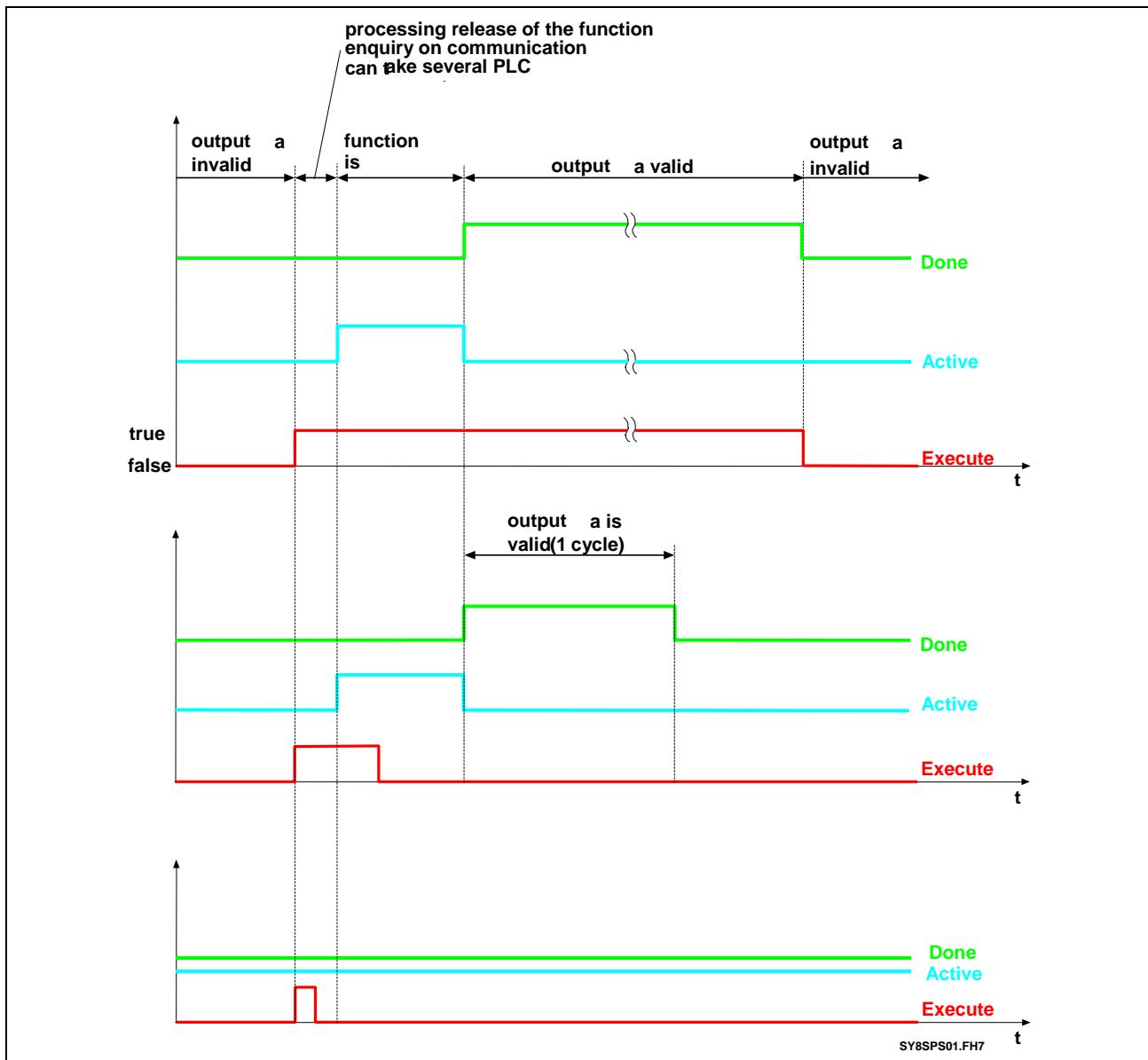
Fig. 4-5: Runtime Behavior of the FB's for the Non-Cyclic Channel

Run-time behavior of the function blocks for the non-cyclic communication between the ISP200 and VisualMotion.

Function Blocks for Non-Cyclic Communication

VM_RD_PARA

VM_RD_PARA requests 2 or 4 byte parameter/variable or register values from VisualMotion via the non-cyclic channel.
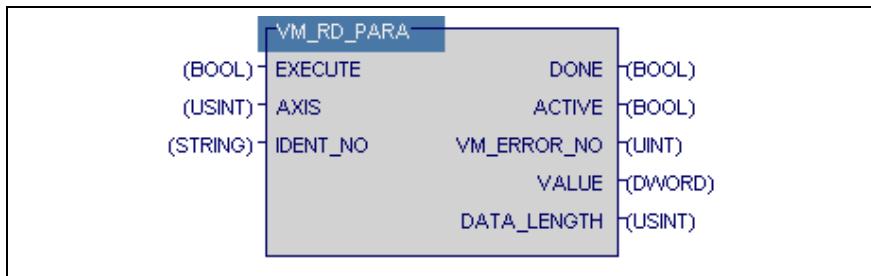
Fig. 4-6: VM_RD_PARA Function Block Input / Output Variables

This function block is used to communicate to VisualMotion via the Non-Cyclic channel and Bosch Rexroth's short format 3 protocol. It begins operation with a rising edge on EXECUTE, and will then request the parameter specified with AXIS and IDENT_NO inputs from VisualMotion. While the function is waiting for a response, the ACTIVE output will be high. When a response is received, or an error is encountered the DONE bit will be high and the outputs VM_ERROR_NO, VALUE and DATA_LENGTH will be valid.

Input / Output Variables

The following tables describe the input and output variables used in the VM_RD_PARA function block.

Input	Type	Description
EXECUTE	BOOL	Rising edge begins function block. Must stay active while ACTIVE output is high. Output is valid as long as EXECUTE and DONE bit remains high.

AXIS	USINT	A, S or P parameters: SERCOS number of the drive
		
		T parameters: Task A = 1
		             Task B = 2
		             Task C = 3
		             Task D = 4
		
		C parameters, Registers or Variables: 0

IDENT_NO	STRING	String name for a VisualMotion parameter, variable or register.
		
		Formatting example: C-0-0003 or c3 (not case sensitive)
		
		Parameter C = Control
		                     T = Task Parameter
		                     A = Axis Parameter
		
		Standard Parameter S = SERCOS
		Product Specific P = SERCOS
		Register R = VisualMotion
		Program Float F = VisualMotion
		Global Integer G = VisualMotion
		Global Float H = VisualMotion Program
		Integer I = VisualMotion

Table 4-12: VM_RD_PARA Input Variables

Output	Type	Description
DONE	BOOL	The outputs VM_ERROR_NO and VALUE are now valid.
ACTIVE	BOOL	The function block is waiting response from VisualMotion.
VM_ERROR_NO	UINT	Error message received from VisualMotion.
VALUE	DWORD	Parameter value in DWORD format
DATA_LENGTH	USINT	Byte length of the data in VALUE, either 2 or 4 bytes.

Table 4-13: VM_RD_PARA Output Variables

Error Handling

The function block VM_RD_PARA can generate the following errors:

System Variable	Value	Description
S#ErrorFlg	TRUE	Error in Function
S#ErrorTyp	282	
S#ErrorNr	1	Input data error
	6	Unexpected internal error
	201	VisualMotion Communication Error. See VM_ERROR_NUM for details.

Table 4-14: VM_RD_PARA Error Handling

VM_WR_PARA

VM_RD_PARA writes a 2 or 4 byte parameter/variable or register value to VisualMotion via the non-cyclic channel.
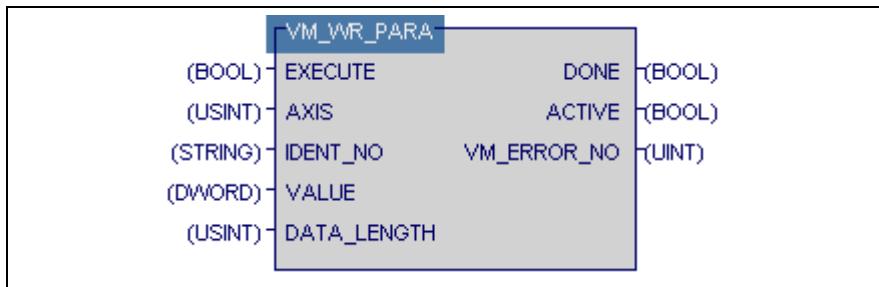
Fig. 4-7: VM_WR_PARA Function Block

The information entered in the VALUE input is sent to the VisualMotion parameter/variable described by the AXIS and IDENT_NO inputs following a rising edge of the EXECUTE input. The function block will then remain in the "active" state while the ACTIVE bit remains high. It has completed processing when the DONE bit goes high. If no error is present in the VM_ERROR_NO output, the writing of data was successful.

Input / Output Variables

The following tables describe the input and output variables used in the VM_WR_PARA function block.

Input	Type	Description
EXECUTE	BOOL	Rising edge begins function block. Must stay active while ACTIVE output is high. Output is valid as long as EXECUTE and DONE bit remains high.

AXIS	USINT	A, S or P parameters: SERCOS number of the drive
		
		T parameters: Task A = 1
		                     Task B = 2
		                     Task C = 3
		                     Task D = 4
		
		C parameters, Registers or Variables: 0

IDENT_NO	STRING	String name for a VisualMotion parameter, variable or register.
		
		Formatting example: C-0-0003 or c3 (not case sensitive)
		
		Parameter C = Control
		                              T = Task Parameter
		                              A = Axis Parameter
		
		Standard Parameter S = SERCOS
		
		Product Specific P = SERCOS
		
		Register R = VisualMotion
		
		Program Float F = VisualMotion
		
		Global Integer G = VisualMotion
		
		Global Float H = VisualMotion
		
		Program Integer I = VisualMotion

VALUE	DWORD	Value in DWORD format to write to the VM parameter
DATA_LENGTH	USINT	Byte length of the data in VALUE, either 2 or 4 bytes. 2 = VM Register and 2 byte parameter 4 = VM Variable or 4 byte Parameter

Table 4-15: VM_WR_PARA Input Variables

Output	Type	Description
DONE	BOOL	The function block has finished processing. If no error, the value has been successfully written to VisualMotion.
ACTIVE	BOOL	The function block is waiting response from VisualMotion.
VM_ERROR_NO	UINT	Error message received from VisualMotion.

Table 4-16: VM_WR_PARA Output Variables

Error Handling

The function block VM_WR_PARA can generate the following errors:

System Variable	Value	Description
S#ErrorFlg	TRUE	Error in Function
S#ErrorTyp	283	
S#ErrorNr	1	Input data error
	6	Unexpected internal error
	201	VisualMotion Communication Error. See VM_ERROR_NUM for details.

Table 4-17: VM_WR_PARA Error Handling

VM_RD_STRPARA

VM_RD_STRPARA requests parameter data from VisualMotion via the Non-Cyclic channel and returns a string.
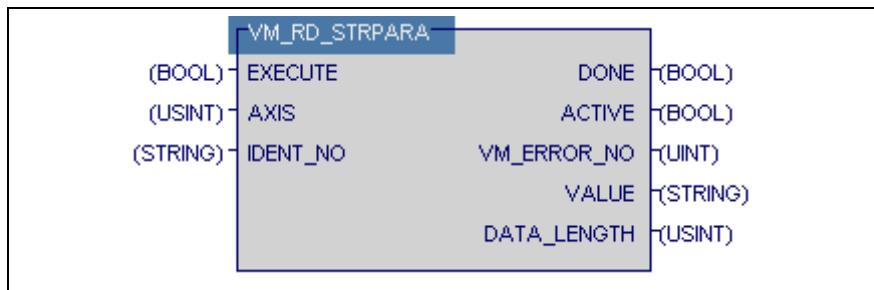
Fig. 4-8: VM_RD_STRPARA Function Block

This function block is used to communicate to VisualMotion via the Non-Cyclic channel and Bosch Rexroth's short format 3 protocol. It begins operation with a rising edge on EXECUTE, and will then request the parameter specified with AXIS and IDENT_NO inputs from VisualMotion. While the function is waiting for a response, the ACTIVE output will be high. When a response is received, or an error is encountered the DONE bit will be high and the outputs VM_ERROR_NO, VALUE and DATA_LENGTH will be valid.

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Input / Output Variables

The following tables describe the input and output variables used in the VM_RD_STRPARA function block.

Input	Type	Description
EXECUTE	BOOL	Rising edge begins function block. Must stay active while ACTIVE output is high. Output is valid as long as EXECUTE and DONE bit remains high.
AXIS	USINT	A, S or P parameters: SERCOS number of the drive
		T parameters: Task A = 1 Task B = 2 Task C = 3 Task D = 4 C parameters: 0
IDENT_NO	STRING	String name for a VisualMotion parameter, variable or register.
		Formatting example: C-0-0003 or c3 (not case sensitive)
		Parameter C = Control T = Task Parameter A = Axis Parameter
		Standard Parameter S = SERCOS Product Specific P = SERCOS

Table 4-18: VM_RD_STRPARA Input Variables

Output	Type	Description
DONE	BOOL	The outputs VM_ERROR_NO and VALUE are now valid.
ACTIVE	BOOL	The function block is waiting response from VisualMotion.
VM_ERROR_NO	UINT	Error message received from VisualMotion.
VALUE	STRING	Parameter data in String format
DATA_LENGTH	USINT	Byte length of the data in VALUE

Table 4-19: VM_RD_STRPARA Output Variables

Error Handling

The VM_RD_STRPARA function block can generate the following errors:

System Variable	Value	Description
S#ErrorFlg	TRUE	Error in Function
S#ErrorTyp	284	
S#ErrorNr	1	Input data error
	6	Unexpected internal error
	201	VisualMotion Communication Error. See VM_ERROR_NUM for details.

Table 4-20: VM_RD_STRPARA Error Handling

MC_RW_ARRAY_TLG

MC_RW_ARRAY_TLG is used to send Non-Cyclic messages to a motion control via the DPR and output the response using arrays of 272 bytes.
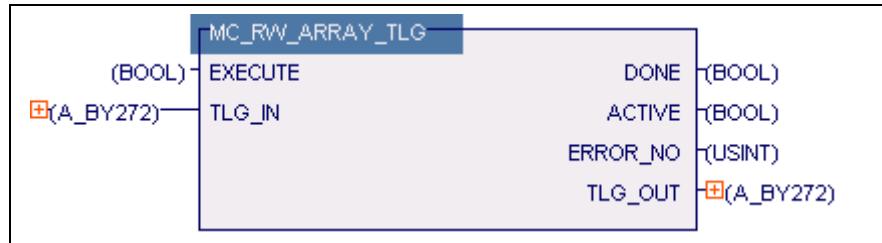
Fig. 4-9: MC_RW_ARRAY_TLG Function Block

After a rising edge of the EXECUTE input, the function block transmits the telegram in the byte array TLG_IN to the motion control. After the response is received, it is output on TLG_OUT also as a byte array. All formatting of the communication protocols to and from the byte array format must be done by the programmer.

Note:	The operating data are to filed in Motorola format; accordingly, if a word is to be transmitted, proceed as follows:

LD   Word

HIGH_BYTE

ST   Byte[n]

LD   Word

LOW_BYTE

ST   Byte[n+1]

If a Dword is to be transmitted, proceed accordingly.

Note:	If 2 bytes are to be combined to form one word on the output side, proceed as follows:

LD   Byte[n]

CONCAT_BYTE   (LBYTE_:= Byte[n+1])

ST   Word

If 4 bytes are to be combined to form a Dword, proceed accordingly.

Input / Output Variables

The following tables describe the input and output variables used in the MC_RW_ARRAY_TLG function block.

Input	Type	Description
EXECUTE	BOOL	Begin operation with a rising edge
TLG_IN	ARRAY of 272 BYTES	User-defined telegram request from PLC to MC

Table 4-21: MC_RW_ARRAY_TLG Input Variables

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Output	Type	Description
DONE	BOOL	The outputs are now valid.
ACTIVE	BOOL	Waiting for MC response. Outputs are not valid.
ERROR_NO	USINT	Equivalent to S#ErrorNr (0 = No error)
TLG_OUT	ARRAY of 272 BYTES	User-defined telegram response to PLC from MC

Table 4-22: MC_RW_ARRAY_TLG Output Variables

Error Handling

The function block can generate the following system error codes:

System variable	Value	Description
S#ErrorFlg	TRUE	
S#ErrorType	-309	
S#ErrorNo	203	Unexpected IRQ (answer)
	204	Unexpected IRQ (request)
	208	System error (state machine)
	209	No MC interfacing
	210	Abort of all data transmissions activated
	211	Channel assignment routine blocked
	255	Timeout communication

Table 4-23: MC_RW_ARRAY_TLG Error Handling

Note: The timeout time can be adjusted by a card parameter C-0-2647 ISP Function Block Timeout in VisualMotion.

Function Blocks for VisualMotion Diagnostics

MC_DIAGNOSIS

MC_DIAGNOSIS allows the PLC to read the motion control's diagnostic information. VisualMotion will only return valid data on the ERROR_CODE and DIAGNOSIS outputs.
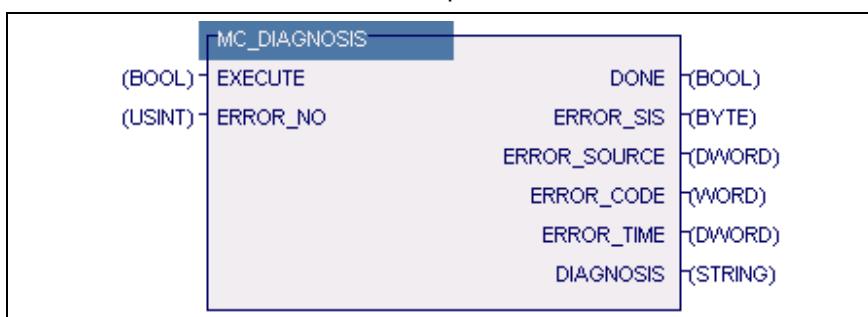
Fig. 4-10: MC_DIAGNOSIS Function Block

MC_DIAGNOSIS is triggered by the rising edge of the EXECUTE input. For VisualMotion either assign the ERROR_NO to 0 or leave open for the proper diagnostic information to be read. When DONE = 1 following the rising edge of EXECUTE, ERROR_CODE and DIAGNOSIS will contain the current diagnostic information for the PPC connected via Dual-Port RAM.

Note: The outputs are not reset or updated until a new rising edge is seen on EXECUTE.

Input / Output Variables

The following tables describe the input and output variables used in the MC_DIAGNOSIS function block.

Input	Type	Description
EXECUTE	BOOL	Begin operation with a rising edge
ERROR_NO	USINT	Error number to be checked. With VisualMotion assign to 0 or leave open.

Table 4-24: MC_DIAGNOSIS Input Variables

Output	Type	Description
DONE	BOOL	The outputs are now valid.
ERROR_SIS	BYTE	Future
ERROR_SOURCE	DWORD	Future
ERROR_CODE	WORD	C-0-0123 Diagnostic Code (number is in base 10)
ERROR_TIME	DWORD	Future
DIAGNOSIS	STRING	C-0-0122 Diagnostic Message, C-0-0124 Extended Diagnostic

Table 4-25: MC_DIAGNOSIS Output Variables

VisualMotion Error Codes

Error code	Error description
0x0000 – 0x00C7	(001-199) Status messages
0x00C9 – 0x018F	(201-399) Warning messages
0x0190 – 0x0257	(400-599) Shutdown messages

Table 4-26: MC_DIAGNOSIS Error Codes

Refer to the VisualMotion 9 Troubleshooting Guide for descriptions of all error messages.

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Error Handling

The function block MC_DIAGNOSIS does not generate errors.

System Variable	Value	Description
S#ErrorFlg	FALSE	
S#ErrorType	-285	
S#ErrorNo	0	The function block does not generate errors.

Table 4-27: MC_DIAGNOSIS Error Handling

MC_RD_PHASE

MC_RD_PHASE reads the current SERCOS phase of the motion control.
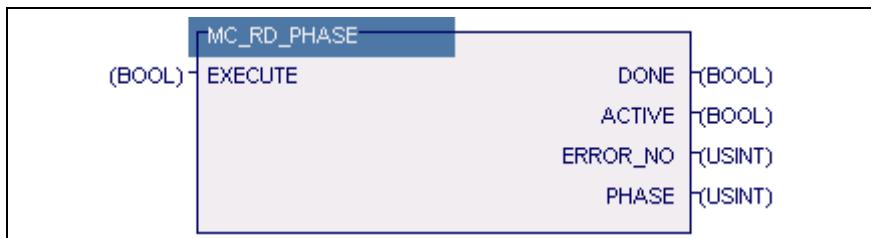
Fig. 4-11: MC_RD_PHASE Function Block

With a rinsing edge on the EXECUTE input, MC_RD_PHASE reads the current SERCOS communication phase of the Motion Control. For the request, the function block does not need the non-cyclic channel; thus, it can also be used for cyclic polling of the communication phase in the PLC program. For this purpose, an the program must toggle EXECUTE between successive PLC cycles (1→ 0 →1).

Input / Output Variables

The following tables describe the input and output variables used in the MC_RD_PHASE function block.

Input	Type	Description
EXECUTE	BOOL	Begin operation with a rising edge

Table 4-28: MC_RD_PHASE Input Variable

Output	Type	Description
DONE	BOOL	The outputs are now valid.
ACTIVE	BOOL	Reading of SERCOS phase active, output variables currently invalid
ERROR_NO	USINT	Equivalent to S#ErrorNr (0 = No error)
PHASE	USINT	Current SERCOS phase of the Motion Control

Table 4-29: MC_RD_PHASE Output Variables

Error Handling

The function block MC_RD_PHASE can generate the following system error codes. The code S#ErrorNo 200, 201, 202, 203, 204, 210 or 211 will only occur if a free SIS channel is used for the request.

System variable	Value	Description
S#ErrorFlg	TRUE	
S#ErrorTyp	-290	
S#ErrorNr	202	Check sum error in the transmission protocol
	203	Unexpected IRQ (answer)
	204	Unexpected IRQ (request)
	208	System error (state machine)
	209	No MC interfacing
	210	Abort of all data transmissions activated
	211	Channel assignment routine blocked
	255	Communication timeout

Table 4-30: MC_RD_PHASE Error Handling

Function Blocks for Multiplexing

The multiplex FB's work with the multiplexed area of the Cyclic Channel in order to increase the number of transferred data between the PLC and the motion control. The FB's provide an array which contains all the multiplexed data.

Note: The multiplex feature is supported by GPP9 only.

The FB's are developed for **secondary multiplex method** (VisualMotion Fieldbus Mapper => Multiplex Method: secondary)

Multiplexing with the PLC firmware PLC07-G05-04V26 and earlier works only if the program is running with a **timer task**. It can be recommended to use a later PLC version when the multiplex feature is used.

Function block PB_RD_MUX_DATA32

The function block PB_RD_MUX_DATA32 coordinates the progression of the multiplex levels in the Cyclic Channel of the PPC in the data direction from the PPC to the PLC. The multiplexed actual values from the structure of the inputs (EK_IN_PPC32) are copied to an array. For a maximum of 16 multiplex levels and 25 multiplex words, the array should have the following structure:

```
STRUCT
        DATA_IN : ARRAY  [0 .. 15, 1 .. 25 ] OF WORD ;
END_STRUCT ;
```

Note: The non-multiplexed part of the inputs/outputs is not overwritten by the function block and must be processed separately.
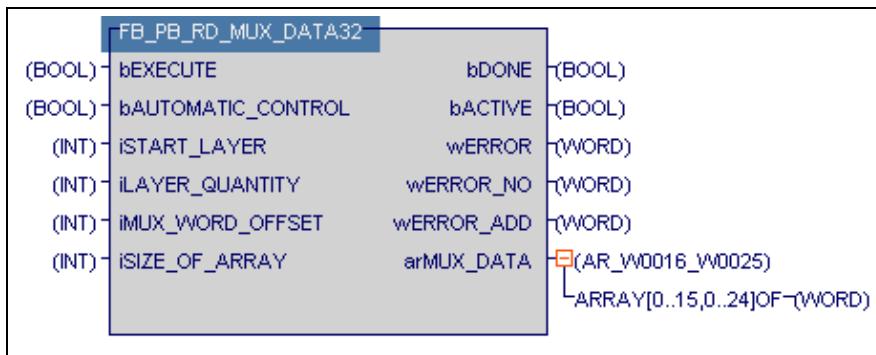
Fig. 4-12: PB_RD_MUX_DATA32 Function Block

Input and Output variables

The following tables describe the input and output variables used in the PB_RD_MUX_DATA32 function block.

Identifier	Description	Type
EXECUTE	Function enabled for processing	BOOL
AUTOMATIC_ CONTROL	Boolean coding of single /cyclic processing	BOOL
START_LAYER	First level to be multiplexed (e.g. Mux Level 0 =>1 => 2; START_LAYER = 1)	INT
LAYER_ QUANTITY	Number of the levels to be multiplexed (e.g. Mux Level 0 =>1 => 2; LAYER_ QUANTITY = 3)	INT
MUX_WORD_ OFFSET	First multiplexed word in the real time channel (e.g. 16words non-mux data, 16words mux data; MUX_WORD_ OFFSET = 17, the17th word is the first multiplexed word)	INT
SIZE_OF_ ARRAY	Size of the array (in bytes) from which the data supplied to the PPC are taken (e.g. 800 for an array with 25*16words)	INT

Table 4-31: PB_RD_MUX_DATA32 Input Variables

Identifier	Description	Type
DONE	Block processed, output data valid	BOOL
ACTIVE	Request being processed	BOOL
ERROR	Error code of execution (binary coding)	WORD
ERROR_NO	Error code according to the binary coding of ERROR	WORD
ERROR_ADD	Additional error code according to the binary coding of ERROR	WORD
MUX_DATA	Array with the data from the multiplex channel	ARRAY

Table 4-32: PB_RD_MUX_DATA32 Output Variables

Function Description

Input Variables

The function block PB_RD_MUX_DATA32 checks the set inputs with **EXECUTE** after the enabling of processing of the function blocks and starts transmission in case of correctness. The function block is processed as long as input EXECUTE is set.

The input **AUTOMATIC_CONTROL** can be used to define whether the levels are to be multiplexed once (single processing, AUTOMATIC_CONTROL == FALSE, example: "0"→"1"→"2"→END) or whether processing is to restart with the level START_LAYER after the last level to be multiplexed has been reached (cyclic processing, AUTOMATIC_CONTROL == TRUE, example: "0"→"1"→"2"→"0"→...).

Starting with level index **START_LAYER** all levels up to the level (START_LAYER + LAYER_QUANTITY – 1) are multiplexed one after the other. The input **LAYER_QUANTITY** specifies the number of the levels to be multiplexed (e.g.: "0"→"1"→"2"→"0"→.... START_LAYER == "1", LAYER_QUANTITY == "3"). The values permissible for input START_LAYER range from "1" to "16", those for the input LAYER_QUANTITY range from "1" to "16".

The input **MUX_WORD_OFFSET** specifies the word to be multiplexed as the first word in the real time channel (e.g. 16words non-mux data, 16words mux data; MUX_WORD_ OFFSET = 17, the17th word is the first multiplexed word). Any preceding words remain untouched by the function block. The values permissible for the input MUX_WORD_OFFSET range from "1" to "25".

The input **SIZE_OF_ARRAY** is used to provide the function block with the size of the target area to which the data is taken. The input SIZE_OF_ARRAY accepts the values "0" to "4096". (e.g. SIZE_OF_ARRAY = 800 for an array with 25*16words)

Output Variables

The output **DONE** acknowledges the termination of the processing of the function block after successful or unsuccessful writing procedure and signals that the outputs are valid. The output DONE is set after all levels of the current cycle have been processed completely. The output DONE is reset, if the input EXECUTE is reset or if a new cycle is started (AUTOMATIC_CONTROL == TRUE).

The output **ACTIVE** is set as long as the block is processed and is not yet completed, i.e. if transmission of all levels of the current cycle is not yet completed. This output is suitable for an external timeout monitoring process.

The function block was not processed error-free if output DONE was set and output **ERROR** was unequal to zero (bit 0 set). The coding of the contents of output ERROR is binary, thus allowing a specification, i.e. the origin and cause of the values of the outputs ERROR_NO and ERROR_ADD can be specified.

Together, the outputs **ERROR_NO** and **ERROR_ADD** as well as further bits (greater bit 0) in the output ERROR allow detailed information on the error cause in the network.

The output **MUX_DATA** provides the data from the multiplex channel to an array.

Error handling

The function block PB_RD_MUX_DATA32 can generate the following error codes:

wERROR	wERROR_NO	wERROR_ADD	Description (Error)
16#0005	16#F201	16#0000	First level to be transmitted is outside of the maximum or minimum ranges (permitted: 1...16)
16#0005	16#F202	16#0000	First word to be multiplexed is outside of the maximum or minimum range (permitted: 1...25)
16#0005	16#F203	16#0000	Number of levels to be multiplexed is outside of the maximum or minimum range (permitted: 1...16)
16#0005	16#F204	16#0000	Total from first level to be multiplexed and number of the levels to be multiplexed (minus 1) is higher than the highest possible level
16#0005	16#F205	16#0000	Number of multiplex words is higher than the data array.
16#0005	16#F206	16#0000	SIZE_OF_ARRAY incorrect

Table 4-33: PB_RD_MUX_DATA32 Error Codes

Note: The FB PB_RD_MUX_DATA32 does not generate system errors like S#ErrorFlg, S#ErrorType, S#ErrorNr

Function block PB_WR_MUX_DATA32

The function block PB_WR_MUX_DATA32 coordinates the progression of the multiplex levels in the Cyclic channel of the PPC in the data direction from the PLC to the PPC. The multiplexed command values for the structure of the outputs (EK_OUT_PPC32) are taken from an array. For a maximum of 16 multiplex levels and a maximum of 25 multiplex words, the array should have the following structure:

STRUCT

DATA_IN : ARRAY [0 .. 15, 1 .. 25] OF WORD ;

END_STRUCT ;

Note: The non-multiplexed part of the inputs/outputs is not overwritten by the function block and must be processed separately.
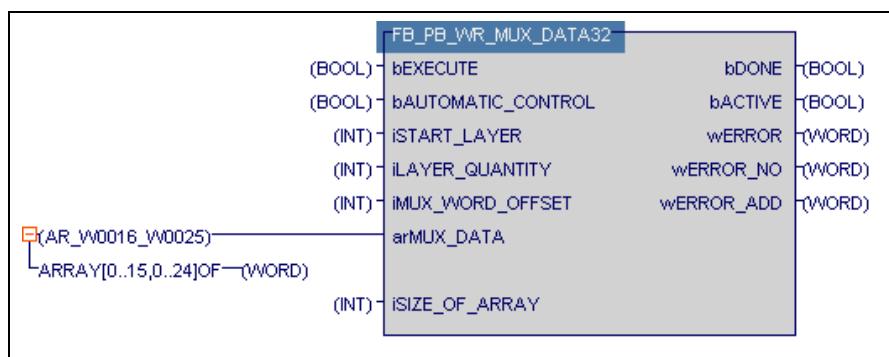

Fig. 4-13: PB_WR_MUX_DATA32 Function Block

Input and Output Variables

The following tables describe the input and output variables used in the PB_WR_MUX_DATA32 function block.

Identifier	Description	Type
EXECUTE	Function enabled for processing	BOOL
AUTOMATIC_ CONTROL	Boolean coding of single /cyclic processing	BOOL
START_LAYER	First level to be multiplexed (e.g. Mux Level 0 =>1 => 2; START_LAYER = 1)	INT
LAYER_ QUANTITY	Number of the levels to be multiplexed (e.g. Mux Level 0 =>1 => 2; LAYER_ QUANTITY = 3)	INT
MUX_WORD_ OFFSET	First multiplexed word in the real time channel (e.g. 16words non-mux data, 16words mux data; MUX_WORD_ OFFSET = 17, the17th word is the first multiplexed word)	INT
MUX_DATA	Array with the data transferred to the multiplex channel.	ARRAY
SIZE_OF_ ARRAY	Size of the array (in bytes) from which the data supplied to the PPC are taken (e.g. 800 for an array with 25*16words)	INT

Table 4-34: PB_WR_MUX_DATA32 Input Variables

Identifier	Description	Type
DONE	Block processed, output data valid	BOOL
ACTIVE	Request being processed	BOOL
ERROR	Error code of execution (binary coding)	WORD
ERROR_NO	Error code according to the binary coding of ERROR	WORD
ERROR_ADD	Additional error code according to the binary coding of ERROR	WORD

Table 4-35: PB_WR_MUX_DATA32 Output Variables

Functional description

Input variables   The function block PB_WR_MUX_DATA32 checks the set inputs with **EXECUTE** after the enabling of processing of the function blocks and starts transmission in case of correctness. The function block is processed as long as input EXECUTE is set.

The input **AUTOMATIC_CONTROL** can be used to define whether the levels are to be multiplexed once (single processing, AUTOMATIC_CONTROL == FALSE, example: "0"→"1"→"2"→END) or whether processing is to restart with the level START_LAYER after the last level to be multiplexed has been reached (cyclic processing, AUTOMATIC_CONTROL == TRUE, example: "0"→"1"→"2"→"0"→...).

Starting with level index **START_LAYER** all levels up to the level (START_LAYER + LAYER_QUANTITY – 1) are multiplexed one after the other. The input **LAYER_QUANTITY** specifies the number of the levels to be multiplexed (e.g.: "0"→"1"→"2"→"0"→.... START_LAYER == "1", LAYER_QUANTITY == "3"). The values permissible for input

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START_LAYER range from "1" to "16", those for the input LAYER_QUANTITY range from "1" to "16".

The input **MUX_WORD_OFFSET** specifies the word to be multiplexed as the first word in the real time channel (e.g. 16words non-mux data, 16words mux data; MUX_WORD_ OFFSET = 17, the17th word is the first multiplexed word). Any preceding words remain untouched by the function block. The values permissible for the input MUX_WORD_OFFSET range from "1" to "25".

The input **MUX_DATA** provides the data to the FB and multiplex channel. The FB will send this data via the multiplex channel to the motion control.

The input **SIZE_OF_ARRAY** is used to provide the function block with the size of the source area from which the data is taken. The input SIZE_OF_ARRAY accepts the values "0" to "4096". (e.g. SIZE_OF_ARRAY = 800 for an array with 25*16words).

Output variables   The output **DONE** acknowledges the termination of the processing of the function block after successful or unsuccessful writing procedure and signals that the outputs are valid. The output DONE is set after all levels of the current cycle have been processed completely. The output DONE is reset, if the input EXECUTE is reset or if a new cycle is started (AUTOMATIC_CONTROL == TRUE).

The output **ACTIVE** is set as long as the block is processed and is not yet completed, i.e. if transmission of all levels of the current cycle is not yet completed. This output is suitable for an external timeout monitoring process.

The function block was not processed error-free if output DONE was set and output **ERROR** was unequal to zero (bit 0 set). The coding of the contents of output ERROR is binary, thus allowing a specification, i.e. the origin and cause of the values of the outputs ERROR_NO and ERROR_ADD can be specified.

Together, the outputs **ERROR_NO** and **ERROR_ADD** as well as further bits (greater bit 0) in the output ERROR allow detailed information on the error cause in the network.

Error handling

The function block PB_WR_MUX_DATA32 can generate the following error codes:

wERROR	wERROR_NO	wERROR_ADD	Description (error)
16#0005	16#F201	16#0000	First level to be transmitted is outside of the maximum or minimum ranges (permitted: 1...16)
16#0005	16#F202	16#0000	First word to be multiplexed is outside of the maximum or minimum range (permitted: 1...25)
16#0005	16#F203	16#0000	Number of levels to be multiplexed is outside of the maximum or minimum range (permitted: 1...16)
16#0005	16#F204	16#0000	Total from first level to be multiplexed and number of the levels to be multiplexed (minus 1) is higher than the highest possible level
16#0005	16#F205	16#0000	Number of multiplex words is higher than the data array.
16#0005	16#F206	16#0000	SIZE_OF_ARRAY incorrect

Table 4-36: Error codes PB_WR_MUX_DATA32

Note: The FB PB_WR_MUX_DATA32 does not generate system errors like S#ErrorFlg, S#ErrorType, S#ErrorNr

4.3 Importing WinPCL Function Blocks

VM9_WINPCL4_DPR_01V00 Demo Project

There is a complete working project for the PLC and VisualMotion available on the WinPCL4 demo CD. We recommend to start with this project since everything is already configured and working. You can customize and write your own functions and function blocks as well as programs in this project.

Use the following steps to ensure a working system:

1. Prepare the ISP200 (MTS-R) system according to installation instructions in chapter 2.

   • Setup a user in the user management

   • Setup the communication port and your system with SysCon

   • If necessary: Download the MTS-R Firmware

   • Start WinPCL

2. Install the PLC examples from the WinPCL CD by double clicking on the Interconnection WinPCL ⇔ VisualMotion9 link.
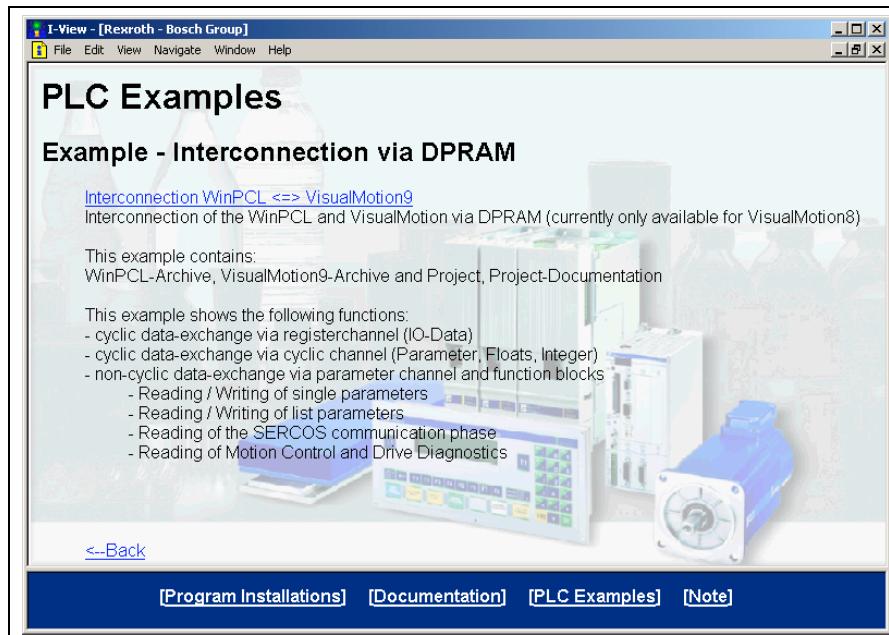
Fig. 4-14: Unpack the examples from the WinPCL CD

3. Access the installed file VM9_WINPCL4_DPR_xxVxx_EN.APV (with WinPCL) and import it into a current variant or into a new variant (Menu: **File ⇒ Archive ⇒ Load archive**).
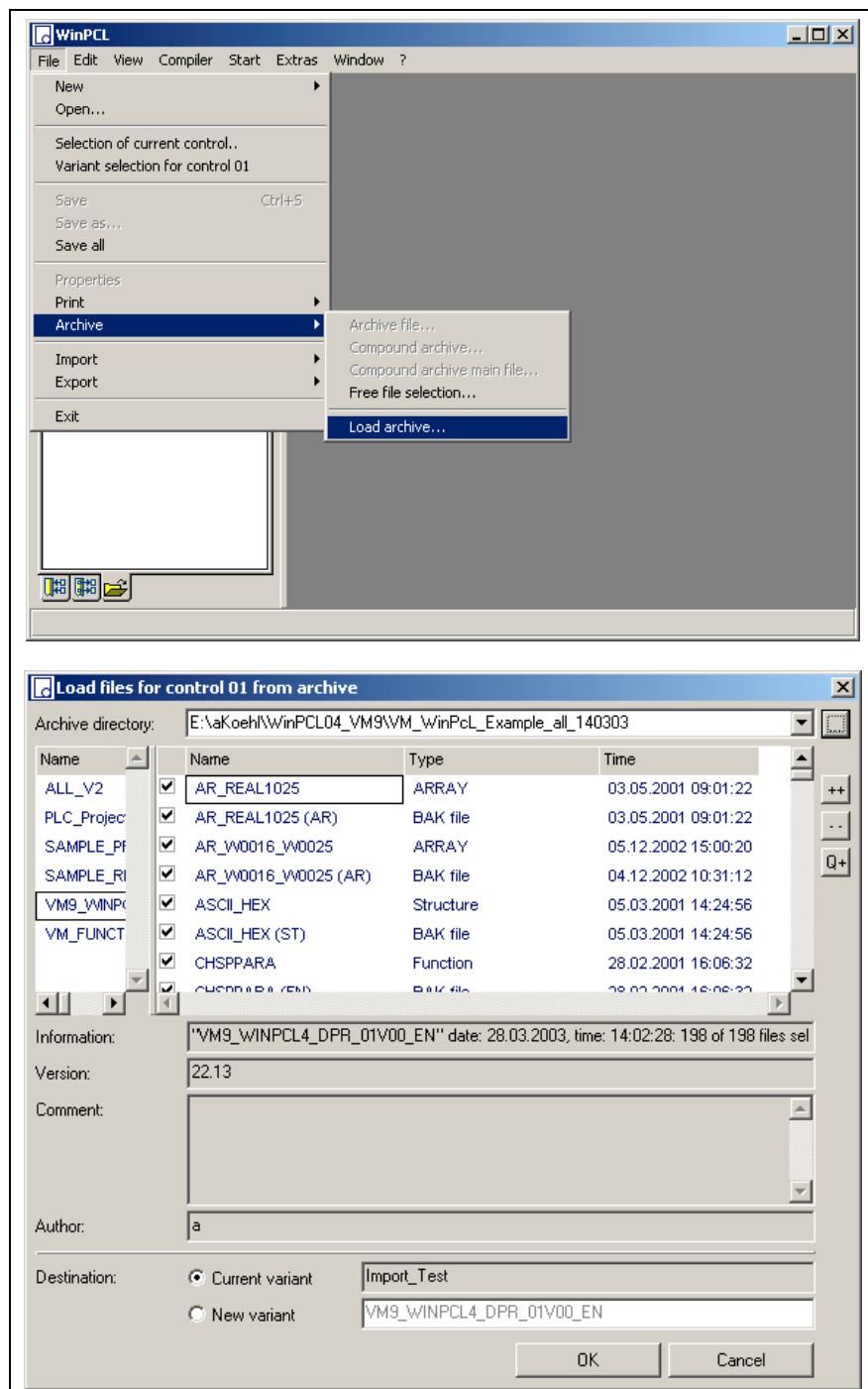
Fig. 4-15: Load the archive into a variant

4. Download this project to the MTS-R.
   (Menu: **Start ⇒ Download SAMPLE_RECOURCE**)

5. The ISP200 is ready for communication with VisualMotion.

6. Setup the PPC-R control using VisualMotion's demo project. The VisualMotion demo project is located in the same folder as the PLC project. Synchronize the VisualMotion project or download just the Fieldbus-Mapper file to the PPC-R.

7. Reboot the PPC-R and MTS-R and communication between the two systems will be initialized.

8. You can now transfer data in the cyclic, register and non cyclic channels.

Note:	The Multiplex feature is not active with the standard VisualMotion project. Download the Fieldbus Mapper file '32Words_16RT_16MUX' to the PPC-R when using the multiplex function blocks.

Copy Components to PLC Variant

It's also possible to copy just components of the demo project VM9_WINPCL4_DPR_xxVxx_EN.APV into another variant.

1. Access the unpacked file VM9_WINPCL4_DPR_xxVxx_EN.APV and import it into a current variant or into a new variant.
   (Menu: ***File ⇒ Archive ⇒ Load archive***)

2. Select just the components you like to import in your project.

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5   WinPCL Diagnostics

5.1   MTS-R H1 Status and Diagnostic Display

Operating State Display

The MTS-R's 7-segment H1 display provides the current operating state and error conditions for the MTS-R. The following 1-digit error codes are used for indicating the diagnosis results.

Code	Meaning
b	Operational (PLC is running)
0.	Power-on state (reset test)
F.	Firmware in Flash EPROM invalid
J.	Boot lock for firmware active
P.	Local bus is not connected

Table 5-1: MTS-R Operating States

Note: Please contact Bosch Rexroth's Service department **immediately** if any other single digit code with a period is displayed.

Error Display

A 7-segment display that flashes in succession is used for displaying **3-digit** error codes. The listed error codes correspond to the system error messages of the user interface.

Code	Meaning
007	Software version error
008	Self-test failed
052	Invalid PLC program
055	Maximum PLC cycle time exceeded
071	PLC operating voltage is low
081	Time-out 2 ms implementation
082	INTERBUS malfunction
083	INTERBUS memory overflow
084	INTERBUS configuration error
085	INTERBUS bus error
086	INTERBUS hardware/firmware error
087	INTERBUS I/O bus module error
088	INTERBUS not ready
089	INTERBUS general generation 4 error
091	PPC not found, check C-0-0035 = 1

Table 5-2: MTS-R Error Codes

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5.2   VisualMotion Specific Function Block Error Handling

The MTS-R PLC contains system error management with the variables #ErrorFlg, S#ErrorNr and S#ErrorTyp.

Every Program Organization Unit (POU) has these variables already embedded. The system copies the value of these variables to the calling POU as long as the #ErrorFlg of the calling POU is low.

With this mechanism, it's possible to track the source of the error. Bosch Rexroth functions and function blocks have this concept build in.

It's possible to identify the source POU and error cause with the following error codes:

(S#ErrorTyp) Cause of Error

Error Code	Function block
-285	MC_DIAGNOSIS
-290	MC_RD_PHASE
-309	MC_RW_ARRAY_TLG
250	CHSPPARA
282	VM_RD_PARA
283	VM_WR_PARA
284	VM_RD_STRPARA

Table 5-3: Overview cause of error

(S#ErrorNr) Reasons for Error

Error Code	Description
1	Invalid input parameter
6	Internal transmission error
7	Type over-range (data length)
201	VisualMotion Communication Error see => VM_ERROR_NO Local error in the SIS content
202	Check sum error in the transmission protocol
203	Unexpected IRQ (answer)
204	Unexpected IRQ (request)
208	System error (state machine)
209	No Motion Control available
210	Abort of all data transmissions activated
211	Channel assignment routine blocked
255	Timeout communication

Table 5-4: Overview Reasons for Error

1 - "Invalid Input Parameter

"The described function blocks and functions check for valid input data and format. The function blocks and functions issue this error if the input data format is invalid. Refer to the following table for the valid range and limits:

Reasons	Permissible range
AXIS	Permitted: 0...99
IDENT_NO	Permissible form: `XZZZZ´ or `X-Y-ZZZZ´ Permissible range `X´: S, s, P, p, A, a, C, c, Y, y Permissible range `Y´: 0...7 Permissible range `Z´: 0...4095
PHASE	Permitted: 0...4
DATA_LENGTH	Permitted: 2, 4
ELEMENT	Permitted: 2...7
NO_OF_BYTES	Permitted with single parameter: 2, 4
ELEMENT_PTR	Minimum size of the input variable with single parameters: 2 or 4 Byte
CUT_ANGLE	Permitted: > 0.0 ... 360.0
SYNC_LENGTH	Permitted: > 0.0 ... 99999.9, > CUT_ANGLE
FORMAT_LENGTH	Permitted: > 0.0 ... 999999.9, > CUT_ANGLE
ADD_CAM_PROF	Permitted: 0, 1

Table 5-5: Permissible Ranges of Input Parameters

Remedy:

- Correction of the faulty input variables.

6 - "Internal transmission error (internal error)

"In case of an internal error during initialization or operating time, such an error can have one of the following reasons, depending on the cause of error (S#ErrorTyp):

Reason in connection with MC_INITIALIZATION (-280):

- The program code of the function block was executed without initialization of the communication between the PLC and motion control. The cause is the missing declaration of at least one cyclic VisualMotion range ("cyclic binary I/O", "cyclic fieldbus channel" and / or "cyclic process data channel") in the IO editor of WinPCL.

Remedy:

- Declare at least one cyclic VisualMotion range ("cyclic binary I/O", "cyclic fieldbus channel" and / or "cyclic process data channel") in the IO editor of WinPCL.

Reason in connection with MC_ABORT_TRANSMISSION (-288):

- The transmission channel could not be released as an activated function block that was assigned to the transmission channel has not been initiated during the runtime of MC_ABORT_TRANSMISSION. The reason for failure to initiate can be due to skips over the activated function block, premature completion of the initiating program organization unit, completed steps in the SFC, or interruption of the task by a higher priority task.

Remedy:

- Initialize an activated function block during the runtime of the function block MC_ABORT_TRANSMISSION.

7 - "Type over-range (data length)

"The function blocks check prior to the write access if the target buffer is large enough for the data volume to be transmitted. Depending on the function blocks, the error can have one of the following reasons.

Reason in connection with MC_RW_PTR_TLG (-289):

- An attempt was made to send more than 272 bytes using the MC_RW_PTR_TLG function block. The transmission channel can transmit a maximum of 272 bytes.

Remedy:

- Limit the number of the bytes to be transmitted to a maximum of 272 by means of the NO_OF_BYTES_IN input.

- If more than 272 bytes are to be transmitted, the MC_RW_PTR_TLG function block must be cascaded.

- or -

- Change the data type of the input variables or exchange the input variables so that it has a maximum size of 272 bytes.

- If more than 272 bytes are to be transmitted, the MC_RW_PTR_TLG function block must be cascaded.

201 - "VisualMotion Communication Error

"One of the function blocks using the non-cyclic channel was not able to transfer the data to or from the PLC. The most recent error causes are:

- Parameter or data not present

- Min / Max value issue

- Drive not present in the SERCOS ring...

Remedy:

Error remedy depending on the VM_ERROR_NO outputs. Refer to the VisualMotion 8 or 9 Troubleshooting Guide for root cause and remedy.

202 - "Check sum error in the transmission protocol

"The function blocks for the non cyclic channel check the checksum in each response telegram and detect a checksum error.

Reason:

- EMV problems

- Hardware and / or firmware error

Remedy:

- Remedy of EMV problems

- Exchange hardware / firmware

- Contact Bosch Rexroth Service

203 - "Unexpected IRQ (answer)

"Using an IRQ, the motion control signals to the PLC its response telegram. If the motion control response by means of an unexpected IRQ, the PLC causes an error.

Reason:

- EMV problems
- Hardware and / or firmware error

Remedy:

- Remedy of EMV problems
- Exchange hardware / firmware
- Contact Bosch Rexroth Service

204 - "Unexpected IRQ (request)

"Using an IRQ, the PLC signals to the motion control its request telegram. In case of an unexpected unknown IRQ, the motion control causes an error which in turn causes an error in the PLC.

Reason:

- EMV problems
- Hardware and / or firmware error

Remedy:

- Remedy of EMV problems
- Exchange hardware / firmware
- Contact Bosch Rexroth Service

208 - "System error (state machine)

"If the program code of the function blocks causes an error, the function block is terminated with a "System error".

Reason:

- EMV problems
- Hardware and / or firmware error

Remedy:

- Remedy of EMV problems
- Exchange hardware / firmware
- Contact Bosch Rexroth Service

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209 - "No Motion Control available

"If the function blocks for the non-cyclic channel between a motion control and the PLC are used without a configured motion control, the function blocks will be terminated with an error.

Reason:

- No configured motion control, or motion control defect.

Remedy:

- Check to see if parameter C-0-0035 = 1 using VisualMotion Toolkit
- Check if VisualMotion I/O's are declared in the PLC I/O declaration and are being used in the PLC program

210 - "Abort of all data transmissions activated

"If during data transmission, the MC_ABORT_TRANSMISSION function block is activated, the function block at which the data transmission was interrupted is terminated with an error.

Reason:

- Abort of data transmission.

Remedy:

- No remedy of error required.

211 - "Channel assignment routine blocked"

The access rights to the transmission channel are regulated by an external channel management routine. If after repeated requests, this routine does not give information on assignment, it has been blocked by another function block of an interrupted task.

Reason:

- A function block of an interrupted task blocks the access to the channel management routine.

Remedy:

- Initialize the interrupted task, and then the interrupted function block
- In case of repeated error messages, contact Bosch Rexroth Service

255 - "Timeout communication

"Using an IRQ, the motion control signals to the PLC its response telegram. If the motion control fails to answer within a given time frame, the PLC will cause an error. The PLC determines its timeout based on parameter C-0-2647 as follows:

$$TimeOut[\text{sec}] = C - 0 - 2647[\text{sec}] + 0.1[\text{sec}]$$

Fig. 5-1: Timeouts of an firmware function block

Reason:

- C-0-2647, "Serial communication - Timeout" is set too low

Remedy:

- Adjustment of C-0-2647, "Serial communication - Timeout"

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7 Service & Support

7.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

-   telefonisch: **+49 (0) 9352 40 50 60**
    über Service Call Entry Center   Mo-Fr 07:00-18:00

-   per Fax: **+49 (0) 9352 40 49 41**

-   per e-Mail: **service@boschrexroth.de**

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

-   by phone: **+49 (0) 9352 40 50 60**
    via Service Call Entry Center Mo-Fr 7:00 am - 6:00 pm

-   by fax: **+49 (0) 9352 40 49 41**

-   by e-mail: **service@boschrexroth.de**

7.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

+49 (0) 171 333 88 26
oder   **+49 (0) 172 660 04 06**

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26
or   **+49 (0) 172 660 04 06**

7.3 Internet

Ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen unserer Service- und Vertriebsbüros finden Sie unter **www.boschrexroth.com** – einige Angaben in dieser Dokumentation können inzwischen überholt sein.

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit Ihrem lokalen Ansprechpartner auf.

☐ Verkaufsniederlassungen
▨ Niederlassungen mit Kundendienst

Additional notes about service, repairs and training as well as the **actual** addresses of our sales- and service facilities are available on the Internet at **www.boschrexroth.com** – some information in this documentation may meanwhile be obsolete.

Please contact the sales & service offices in your area first.

☐ sales agencies
▨ offices providing service

7.4 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

1. detaillierte Beschreibung der Störung und der Umstände.
2. Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.
3. Tel.-/Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the nameplate of the affected products, especially typecodes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

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7.5 Kundenbetreuungsstellen - Sales & Service Facilities

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<u>from abroad</u>:   don't dial (0) after country code!

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97816 Lohr am Main
Kompetenz-Zentrum Europa
 	
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Fax: +49 (0)9352 40-4885
	C A L L E N T R Y C E N T E R
	MO – FR
	    von 07:00 - 18:00 Uhr
	
	    from 7 am – 6 pm
	
	Tel. +49 (0) 9352 40 50 60
	service@boschrexroth.de
		H O T L I N E
		MO – FR
		    von 17:00 - 07:00 Uhr
		    from 5 pm - 7 am
		+ SA / SO
		
		Tel.: +49 (0)172 660 04 06
		oder / or
		Tel.: +49 (0)171 333 88 26
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			♦ nur an Werktagen
			  - only on working days -
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			  - from 7 am - 6 pm -
			
			Tel. +49 (0) 9352 40 42 22

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Nordamerika – North America

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