CL550

Configuration and Commissioning Software Manual

Edition 101

BOSCH
Automation

CL550

Configuration and Commissioning Software Manual

1070 072 262-101 (01.09) GB

Discretionary charge 6.– €

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1 Safety Instructions

Before you start working with the CL550 controller, we recommend that you thoroughly familiarize yourself with the contents of this manual. Keep this manual in a place where it is always accessible to all users.

1.1 Intended use

This manual contains a comprehensive set of instructions and information required for the standard operation of the described products. The described products are used for installation and operation of a CL550 controller.

The described products

- were developed, manufactured, tested and documented in accordance with the relevant safety standards. Normally, the product does not present any danger for people or equipment provided that the specifications and safety instructions relating to project planning, installation, and normal operation of the product are observed.
- fully comply with the requirements of
  - EMC Directives (89/336/EEC 93/68/EEC, and 93/44/EEC)
  - Low-Voltage Directive (73/23/EEC)
  - Harmonized standards EN 50081-2 and EN 50082-2
- are designed for operation in an industrial environment (Class A emissions), i.e.
  - direct connection to the public low-voltage power supply is not permitted;
  - Connection to the medium and/or high-voltage system must be provided via transformer.

  The following applies to the usage in residential settings, in business and commercial areas and in small-industry settings:
  - Installation in an enclosure 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 an individual operating license issued by the appropriate national authority or approval body. In Germany, this is the Regulierungsbehörde für Post und Telekommunikation (RegTP) (Regulatory Body for Post and Telecommunication), and/or its local offices.

☞ **This is a Class A device. In a residential setting, this device may cause radio interferences. In such a case, the user may be required to introduce suitable countermeasures at his own costs.**

Proper transport, handling and storage, placement and installation of the product are indispensable prerequisites for its correct and safe operation.

1.2 Qualified Personnel

The relevant requirements are based on the job specifications as outlined by the ZVEI and VDMA in Germany. Please refer to the following German-Language publication:
Weiterbildung in der Automatisierungstechnik
Editor: ZVEI and VDMA
Maschinenbau Verlag
Postfach 71 08 64
60498 Frankfurt/Germany

This manual is intended for especially qualified PLC experts.

Interventions in the hardware and software of our products that are not described in this manual may only be performed by Bosch's own specifically trained personnel.

Unqualified interventions in the hardware or software or non-compliance with the warnings listed in this instruction manual or indicated on the product may result in serious personal injury or damage of the equipment.

Only trained electricians as per IEV 826-09-01 (modified) who are familiar with the contents of this manual may undertake installation and maintenance tasks regarding the described products.

These electricians

- are, due to their professional training, skills and experience and based upon their knowledge of and familiarity with applicable technical standards, capable of evaluating the work to be carried out, and of recognizing possible dangers.
- possess, based upon several years of working in a comparable field, a level of knowledge and skills that may be deemed equal to that after formal professional education.

With regard to the foregoing, please note our comprehensive training program. For up-to-date information, web shop for teachware and online seminar booking, please refer to http://www.bosch.de/at/didactic or call our training center at (+49) (0) 60 62 78-258.

1.3 Safety Markings on Components

DANGER! High voltage!

DANGER! Corrosive battery acid!

CAUTION! Electrostatically sensitive components!

Disconnect mains power before opening!

Lug for connecting PE conductor only!

Functional earthing or low-noise earth only!

Screened conductor only!

1.4 Safety Instructions in this Manual

DANGEROUS ELECTRICAL VOLTAGE
This symbol warns of the presence of **dangerous electrical voltage**. Insufficient or non-compliance with this warning can result in **personal injury**.

DANGER
This symbol is used whenever insufficient or non-compliance with instructions can result in **personal injury.**

CAUTION
This symbol is used whenever insufficient or non-compliance with instructions can result in **damage of equipment or data files.**

☞ This symbol is used to alert the user to an item of special interest.

★ This symbol indicates an activity to be performed by the user.

1.5 Safety Instructions for the Described Product

DANGER
Life endangered by ineffective EMERGENCY-STOP devices!
EMERGENCY-STOP safety devices must remain effective and accessible during all operating modes of the system. Unlocking the EMERGENCY-STOP device must not cause an uncontrolled system restart! First, test the EMERGENCY-STOP sequence, then restore power!

DANGER
Danger for persons and equipment!
Before operating the system, test every new program!

DANGER
Retrofits or modifications may interfere with the safety of the described products!
The consequences may be severe personal injury or damage to the equipment or the environment. Therefore, any retrofitting or modification of the system utilizing components from other manufacturers does require approval by Bosch.

DANGEROUS ELECTRICAL VOLTAGE
Unless described otherwise, maintenance procedures must only be carried out when the system is turned off! During this process, the system must be safe from unauthorized or inadvertent restart.

If measuring or testing procedures must be carried out when the system is active, it must be done by trained electricians only.

CAUTION
Do not plug or unplug the module as long as the controller is switched on! The module could be destroyed. Turn off or unplug the controller's power supply module, the external power supply and the signal voltage first. Only then plug or unplug the module!

CAUTION
Please use only spare parts that are approved by Bosch!

CAUTION
Please comply with all ESD protection measures when using the module! Avoid electrostatic discharges!

Please comply with the following protection measures for electrostatically endangered modules and components (EEM)!

- The employees responsible for storage, transport and handling must be trained in ESD protection.
- Store and transport EEMs in the specified protective packaging.
- Work with EEMs only at special ESD work stations equipped for this particular purpose.
- Employees, work surfaces and all devices and tools that could come into contact with EEMs must be on the same potential (e.g. earthed).
- An approved earthing wrist strap must be worn. It must be connected to the work surface via a cable with an integrated 1 MΩ resistor.
- EEMs must, under no circumstances, come into contact with objects susceptible to accumulating an electrostatic charge. Most items made of plastic belong to this category.
- When installing EEMs in or removing them from an electronic device, the power supply of the device must be switched OFF.

1.6 Documentation, Software Release and Trademarks

Documentation

This manual contains information about the operation and installation of the CL550 programmable logic controller.
Descriptions regarding the COM-MAP module are excluded.

Available manuals:

Manuals	Language	Order no.
CL550 Controller Manual	English	1070 072 263

☞ **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>, <Del>
- Key combinations (pressed simultaneously): e.g., <Ctrl> + <PgUp>

Version

☞ **This manual is applicable for the following versions:**

Hardware:	**GG4–9**	**201**
	NT4	**101**
	ZS550	**301**
	Con550	**202**
Software:	**Project configurator 1.0**	
	WinSPS 3.01	
	WinDP 2.01	

Trademarks

All trademarks referring to software that is installed on Bosch products when shipped from the factory are the property of their respective manufacturers.

At the time of shipment from the factory, the installed software is protected by copyright. Software may therefore be duplicated only with the prior permission of Bosch or according to the license agreement of the respective manufacturer.

MS-DOS® and Windows™ are registered trademarks of Microsoft Corporation.

PROFIBUS® is a registered trademark of PROFIBUS Nutzerorganisation e.V.

INTERBUS-S® is a registered trademark of Phoenix Contact.

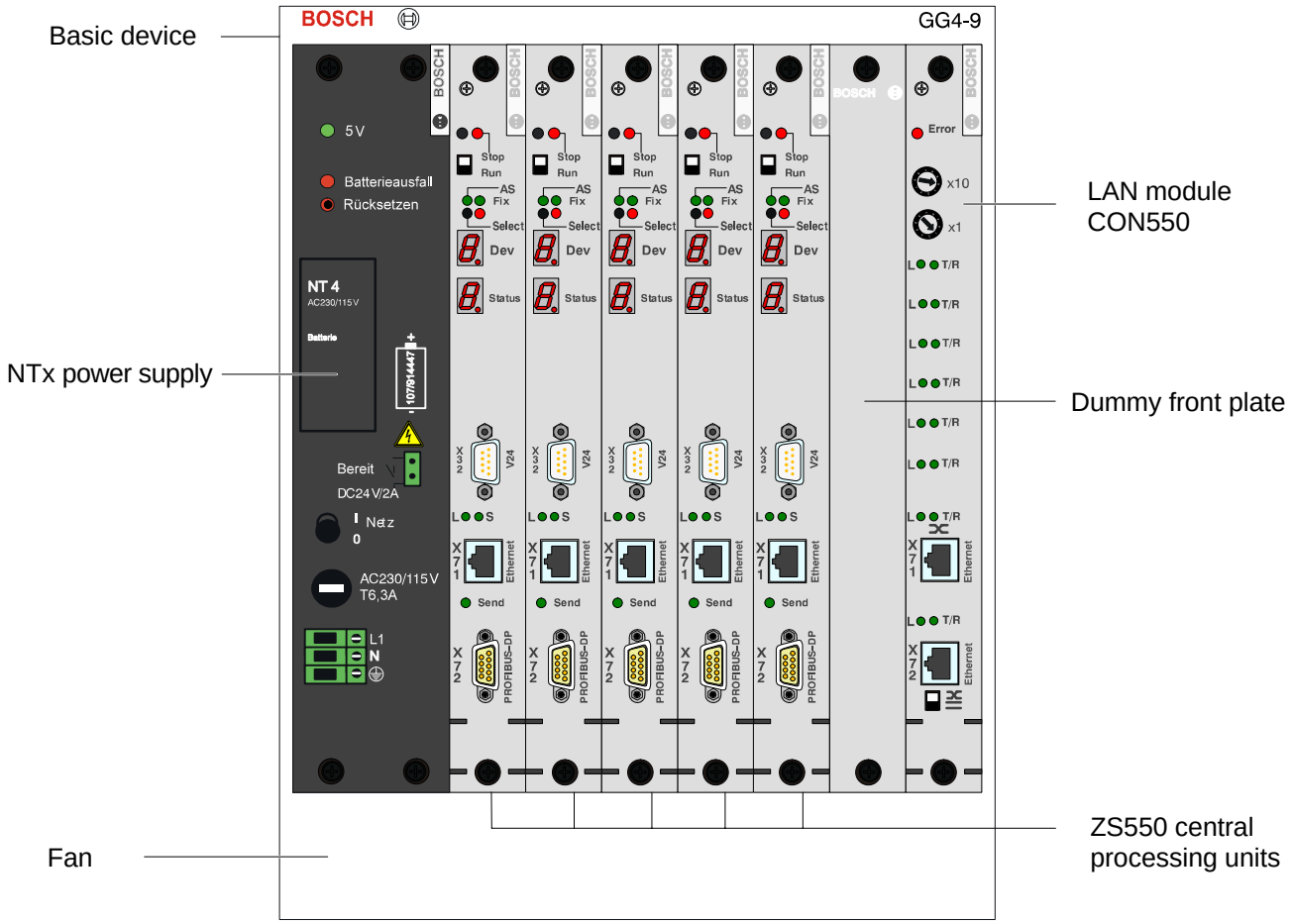
2 System Introduction

The CL550 is an open multiprocessor system with up to six democratic central units. Each central unit constitutes a closed control unit with all data areas and the entire I/O address range. Communication among the modules is processed via Ethernet.

2.1 Control Structure

The controller consists of a GG4-9 basic device. This mounting rack is provided with nine slots. The basic device must contain a power supply module and at least one central processing unit. The remaining slots can be equipped with additional CL550 system modules.

☞ **The ZS550-DP-IBS module necessitates two slots.**



Slot coding

The obligatory slot codes are as follows:

- Slot 1 + 2: NTx power supply
- Slot 9: CON550

The other assignments can be chosen freely. The configurator's default settings provide the following:

- CPU modules (ZS...) are set from left to right, next to the power supply.
- MAP modules are set from right to left.

☞ **Do not plug or unplug live modules.**
When changing modules, accept and check all switching and jumper positions.

ZS550

A **ZS550** module (central processing unit) contains:

- PLC functionality (program flow)
- Busmaster PROFIBUS-DP (V1 functionality) for triggering the in- and outputs
- TCP/IP communication:
  - Backside: system bus communication
  - Frontside: external bus communication
- Serial interface with BUEP19E, BUEP03, and BUEP64 (Bosch transmission protocols)
- The ZS550-DP-IBS mounting rack has been additionally provided with an INTERBUS-S interface.

☞ **The I/O level must be exclusively interfaced via decentralized I/O modules (PROFIBUS-DP/V1).**

CON550

The CON 550 module is an Ethernet switch for communication among the ZS550 central processing units via the backside Ethernet connection.

COM-MAP

The **COM-MAP** module couples the ZS550 modules to a higher-level host system (MAP MMS-EASE protocol).

☞ **Descriptions of the COM-MAP module are not part of this manual.**

Power Supply Unit

The **NTx** power supply (NT1 to NT4) supplies the entire basic device with current.

Programming

The CL550 is programmed with WinSPS, WinDP or the CMD software by Phoenix Contact. The classic PLC languages, like ladder diagram, instructions list, function diagram, sequential function chart, and structured text as well as, alternatively, the high-level language ANSI ”C” are available as programming languages.

For communication with WinSPS, WinDP and other programs, the TCP/IP standard protocol with the BUEP (Bosch transmission protocol) command language is used.

☞ **For further information regarding the CL550 and the operation of the decentralized peripherals via PROFIBUS-DP, please refer to the WinSPS and WinDP online help.**

2.1.1 Ethernet and LAN

A commonly used LAN technology is the Ethernet. It is defined in the IEEE 802.3 specification. All computers connected to the Ethernet network system share the same cable and the highest possible bandwidth of 10 Mbit/s or 100 Mbit/s.

Ethernet and Internet protocols are the basis for communication. On an Ethernet basis, the UDP/IP standard protocol is used in order to send Bosch BUEP commands. The thus created protocol is called BUEP-E. To do so, the ZS550 is provided with two Ethernet interfaces. The interfaces can be operated with up to 100 Mbit/s. One interface is located on the frontside, the other is located on the back and serves for communication on the system bus.

Communication via TCP/IP Ethernet is used with the following two applications:

- Communication PLC – HMI (Human Machine Interface):
  Each CL550 central processing unit communicates with the corresponding HMI via the front Ethernet interface.
- Communication PLC – PLC:
  The central processing units communicate with each other on an Ethernet basis via the CON550 module.

2.1.2 PROFIBUS-DP and DP/V1

For peripheral inputs and outputs, only fieldbus systems, like e.g. PROFIBUS-DP are used.

PROFIBUS is an open, non-proprietary fieldbus standard with a wide application range in manufacturing and process automation. The EN 50170 and EN 50254 international standards guarantee the fieldbus' independence from the manufacturer and its openness. PROFIBUS makes communication among devices of different manufacturers possible without special interface adaptors. PROFIBUS is suitable for fast and time-critical applications as well as complex communication tasks.

The PLC communicates with the decentralized bus stations (I/Os) via the "On-Board" busmaster (EN 50 170).

The busmaster converts the in- and output signals of the PLC into a serial data stream for the PROFIBUS-DP/V1 and monitors the data traffic towards the bus stations. The data exchange with decentralized bus stations (slaves) is cyclic. The master reads the input information from the slaves and writes the output information to the slaves.

The monomaster system configuration allows for the realization of one class 1 busmaster per PLC. The class 1 master processes the user data traffic with those slaves that have been assigned to it. It serves the following master - slave application functions in the DP profile:

- Cyclic user data exchange
- Acquisition of diagnostic information of the DP slaves
- Parameterization and configuration of a maximum of 124 DP slaves
- Control of the DP slaves via control commands

The extended V1 profile realizes the additional master - slave function:

- Acyclic reading/writing

☞ **For further information regarding the operation of the decentralized peripherals via PROFIBUS-DP, please refer to the WinSPS and WinDP online help.**

2.1.3 Fieldbus system INTERBUS

The open fieldbus system INTERBUS commonly connects all processing peripherals with the entire common range of controllers. The serial bus cable is used to network sensors and actuators, to control machines and system parts, to network manufacturing cells and interface higher-level systems, like e.g. control rooms.

Topology and installation

From a topologic point of view, the INTERBUS is a ring-connected system, i.e. that all stations are actively linked within a closed transmission route. Each station regenerates and forwards the incoming signal. The distinctive feature of the INTERBUS system in contrast to other ring-connected systems is that the data is forwarded and returned within the same cable, through all stations. Physically, this results in a line or tree structure. From the busmaster starts a backbone from which the subsystems for structuring the entire system are developed. This way, the bus system can be adapted to any application.

The INTERBUS master - slave system allows the connection of up to 512 stations. The ring will be automatically closed by the last station.

INTERBUS characteristics

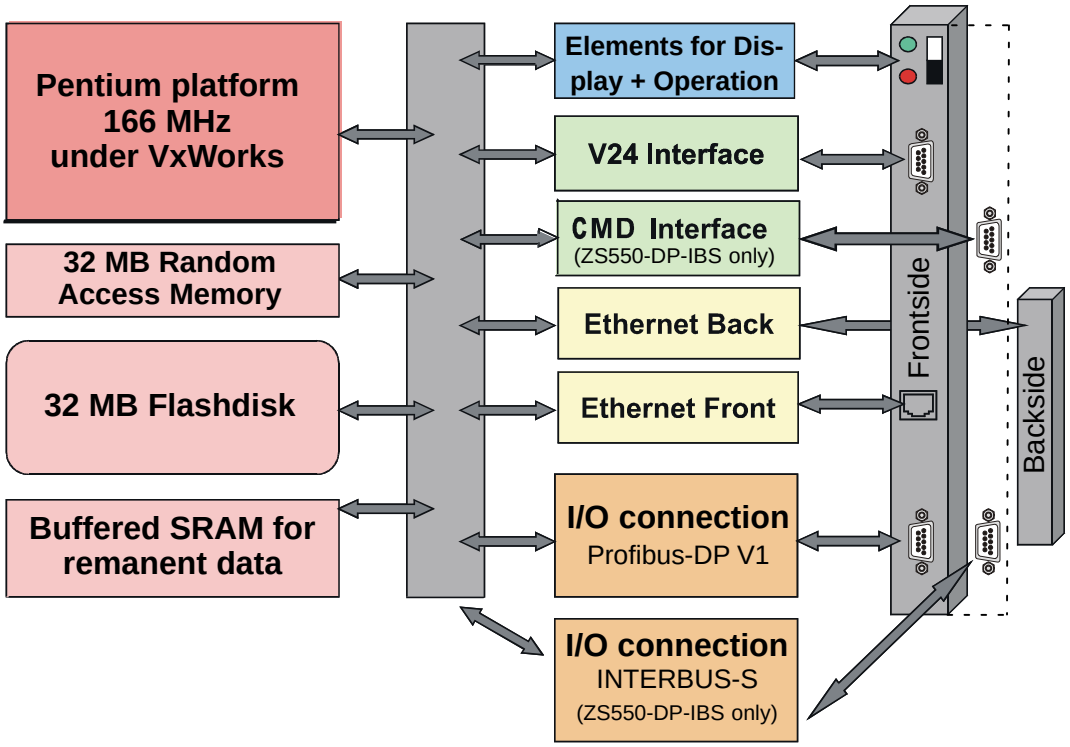
The following data is characteristic for INTERBUS:

- Master-Slave, fixed message length, deterministic
- Ring; every remote-bus station is a repeater
- Transfer rate: 500 Kbit/s
- A maximum of 4096 I/O points
- Bus length: 400 m (between two remote-bus stations)
  Entire length: 13 km
- Typical application fields: general sensor/actuator technology, mechanical engineering and terotechnology, process engineering

Physical addressing

The data is automatically assigned to the single stations via the physical position of the stations in the system.

2.2 ZS550



2.2.1 ZS550 Description (Central Processing Unit)

The control part has been realized through a high-performance PC kernel under VxWorks, the standard operating system.

1500 Kwords have been reserved in the RAM for the control program's memory size. With an average command length of six words per instruction, about 250 K instructions are programmable in addition to the data modules.

Upon start-up, the control program and the data will be copied from the flash memory into the RAM. Then, the remanent data will be read from the SRAM – buffered via NT – and laid over the data in the RAM.

Each central processing unit is provided with several interfaces for communication:

- A serial interface which can be operated alternatively with the BUEP03, BUEP64 or BUEP19E protocol.
- Two Ethernet interfaces with the TCP/IP Internet protocol for sending Bosch BUEP commands. The interfaces can be operated with 100 Mbit/s (Fast Ethernet). One interface is located on the frontside, the other on the back.

The I/Os are operated via a fieldbus at the decentralized peripherals.

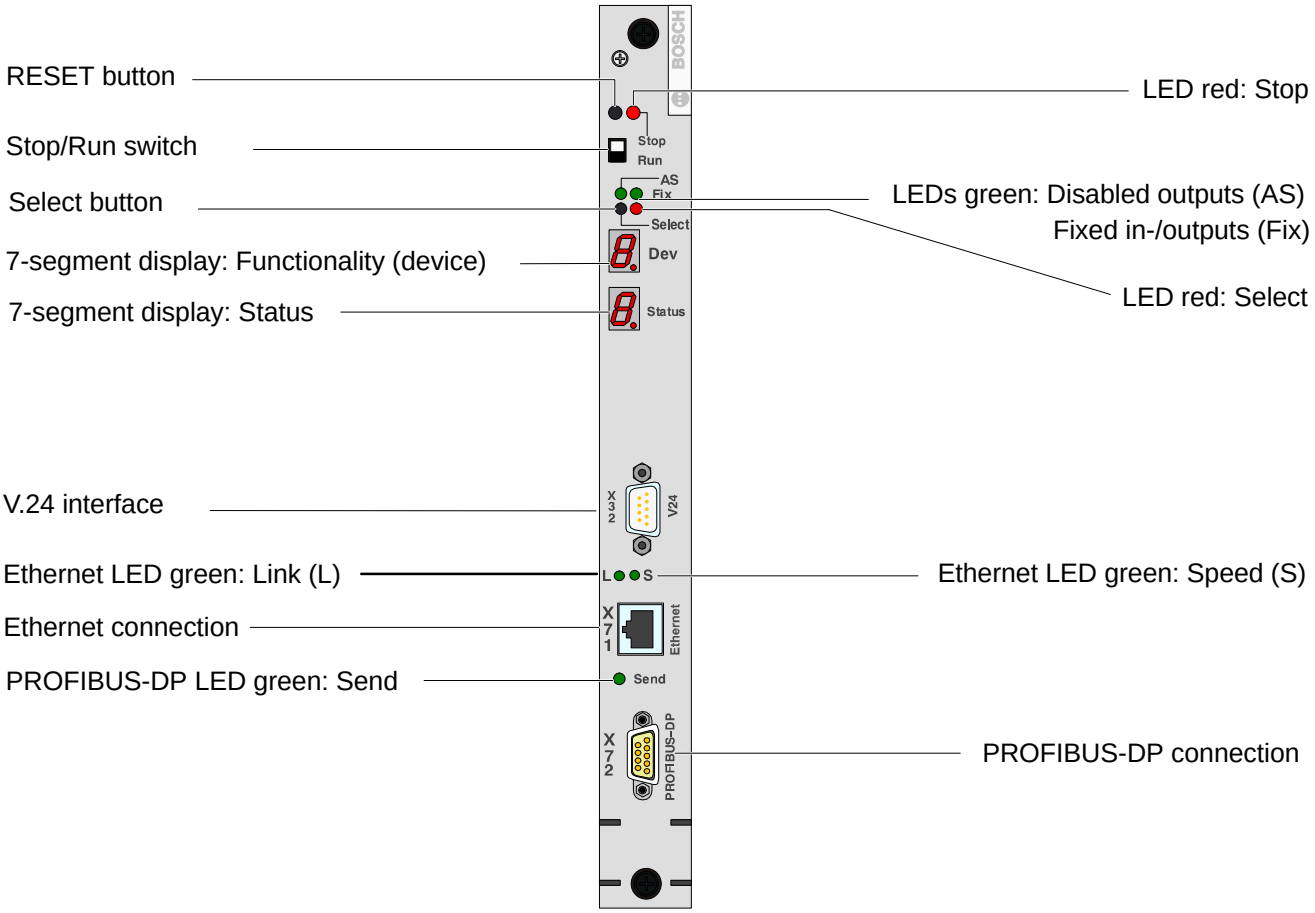
☞ **INTERBUS-S-I/O and PROFIBUS-I/O must not cross each other at the ZS550-DP-IBS. The INTERBUS-S in- and outputs are each addressable from 0 to 1023 (can be set via CMD software, but with a maximum of 512 Byte in-/outputs only). The PROFIBUS-DP in- and outputs should be addressed from I/O 2048 to I/O 8091 (can be set via Win-DP).**

For communication between several central processing units, the additional module CON 550, a switch on the Ethernet, is used.

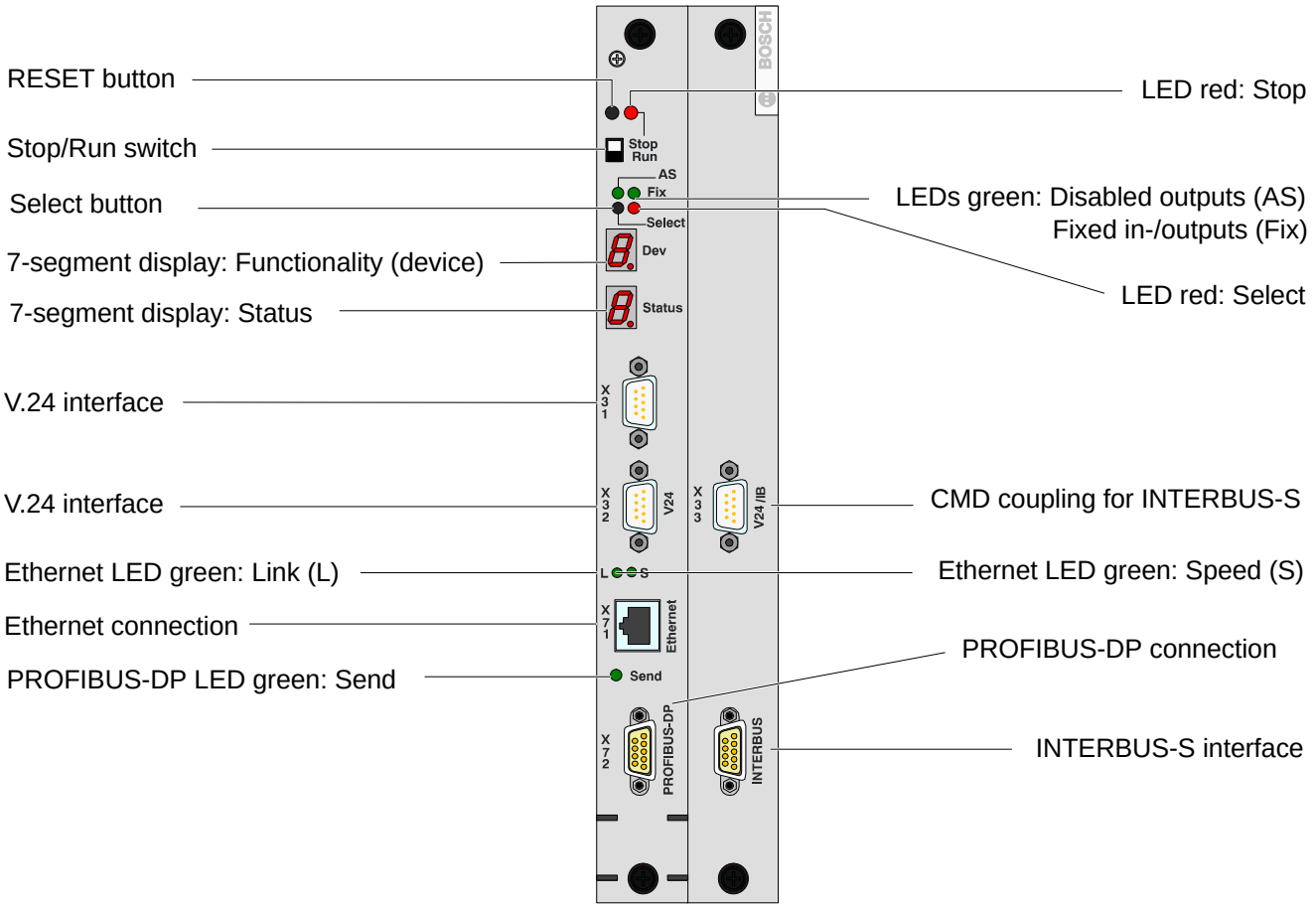
Each module is provided with an unambiguously assigned slot ID in the rack. Together with the rack ID which can be given individually to each rack, this exactly identifies the ZS550 in the system or network.

☞ **During run-up, it is checked if an IP address has been assigned to the central processing units. If this is not the case, the module stops with an error message and waits for a response from the configuration tool. Only when all modules have run up correctly, the entire system will be enabled and the floating contact of the supply unit will be closed.**

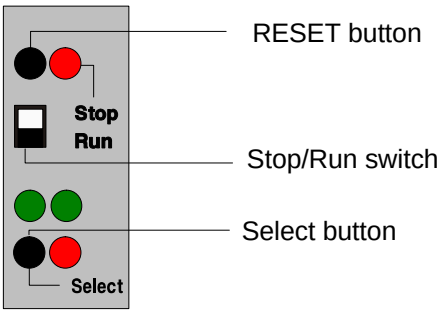
Operating Elements and Displays ZS550



Operating Elements and Displays ZS550-DP-IBS

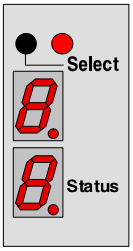


Operating elements



Operating element	Description
RESET button	Restart (admissible in exceptional situations only)
Stop/Run switch Run Stop	Change between Run/Stop ● Program runs ● Outputs are triggered ● Timer and counter values are processed ● The CPU (ZS...) is in Stop mode ● All outputs are set to ”0”. ● Remanent markers, timer and counter values remain valid
Select button	● Selector function ● Display of messages

7-segment displays



Upper display: ZS550 functionality (device)

Lower display: Status code

The status code displayed on the lower display always refers to the ZS550 functionality shown on the upper display.

For the display of the ZS550 functionalities (device) applies the following:

PLC functionality

Busmaster-DP functionality (cyclic I/O processing)

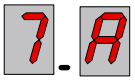
TCP/IP-COM functionality via backside;
systembus communication (channel 0)

TCP/IP-COM functionality via frontside;
external communication (channel 1)

DP/V1-COM functionality (channel 2)

V.24-COM functionality, serial interface – if configurated (channel 3)

INTERBUS-S functionality
(ZS550-DP-IBS only)



Freely configurable for COM-MAP modules or future options
(channels 4–7)

Power supply (backup battery monitoring)

Functional or configuration mode
(refer to chapter 2.2.8, Functional specifications)

Pending messages during the control mode Run merely lead to a lighting up of the LED Select.

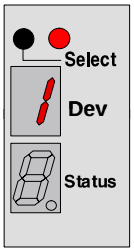
★ Press the Select button in order to switch the pending message up front.

☞ **Messages that lead to a stop of the modules will be switched up front immediately.**

★ For scrolling further messages use the Select button.

2.2.2 PLC Functionality

Status display

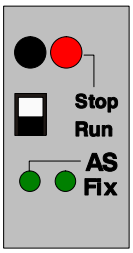


Select : PLC functionality

Status display refers to PLC functionality

Display status	Description
Off	Application program runs
	Remanence error, data loss at user operands
	Storage error, missing application program
	Cyclic time error (HW and SW)
	Application program error (application stack error, module task error, no DM active)
	Application program error (parameter error, address error, module missing)
	HLT command in application program
	STOP via programming device
	STOP via slide switch on the front

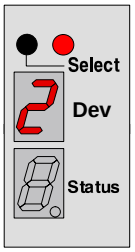
LED displays



LED display	Description
LED red: Stop	
lit	Module stop by ZS (CPU) (detailed info on 7-segment status display)
off	ZS (CPU) in Run mode
LED green: AS	
lit	Outputs disabled: • all outputs are set to ”0”. • PLC program is processed • I/O image is processed
off	Outputs not disabled
LED green: Fix	
lit	In-/outputs/markers are fixed by PLC utility program
off	In-/outputs/markers are not fixed

2.2.3 Busmaster Functionality

Status display



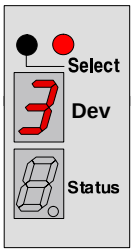
Select: Busmaster functionality (cyclic I/O processing)

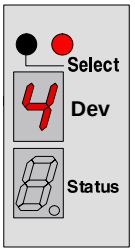
Status display refers to busmaster functionality

Display status	Description
Off	OERATE mode (error-free operation); The busmaster is in cyclic I/O data transfer
	CLEAR mode, cause: ● controller in Stop ● controller in CLAB (disable outputs) The busmaster is in cyclic I/O data transfer For the outputs 00H will be transferred (outputs canceled)
	New master parameter set (MPS) is loaded
	OFFLINE mode The busmaster is offline No or only invalid MPS available
	Bootstrap initialization (after off/on) is active The busmaster tries to start with the existing MPS The initialization phase will be stopped if: ● an error (hardware, address assignment, MPS, etc.) is pending ● all slaves can be reached without an error ● the PLC_Stop_Time is expired
	At least 1 slave indicates a configuration error
	At least 1 slave is not reachable or not ready for cyclic data transfer
	----
	Bus error Busmaster cannot access the bus (no idle state level) Possible causes: ● Short circuit on the field bus ● Terminating resistance not switched on ● Terminating resistance has no voltage
	System error in busmaster

2.2.4 TCP/IP-COM Functionality

Status display



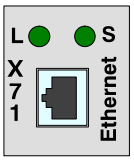


Select: TCP/IP-COM functionality

Status display refers to TCP/IP-COM functionality

Display status	Description
Off	The channel is not active or processes external jobs only (server operation)
0 – F	The central job displayed here is faulty (0–F corresponds to Job ID 0–15)
r	At least one central job with an ID > 15 is faulty
-	The serial channel is used for job reporting (tracer on)
_	The serial channel is used for error reporting (error print on)
U	The Ethernet channel has not been assigned an IP address
n	Errors have been detected during consistency checkup of the configuration file (mounting rack consistency)

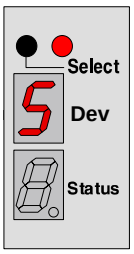
LED displays of the front Ethernet interface



LED display	Description
LED green: L (Link)	
off	No connection
lit	Connection is o.k., no activity
flashes	Connection is o.k., activity
LED green: S (Speed)	
off	10 Mbits/s
on	100 Mbits/s

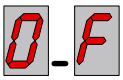
2.2.5 DP/V1-COM Functionality

Status display

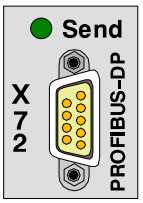


Select: DP/V1-COM functionality

Status display refers to DP/V1-COM functionality

Display status	Description
	The central job displayed here is faulty (0–F corresponds to Job ID 0–15)
	At least one central job with an ID > 15 is faulty

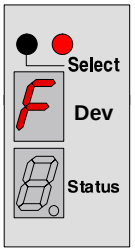
LED 'Send' of the PROFIBUS interface:



LED display	Description
LED green: Send	
lit	Bus interface active
off	Bus interface not active.

2.2.6 Power Supply Functionality

Status display



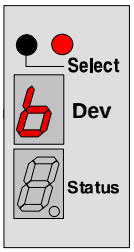
Select: Power supply (backup battery monitoring)

Status display refers to the power supply
(backup battery monitoring)

Display status	Description
Off	Backup battery on the NT4 power supply is o.k.
5	Battery error, backup battery on the NT4 power supply has failed
6	Early battery warning → change backup battery

2.2.7 INTERBUS-S Functionality (ZS550-DP-IBS only)

Status display



Select: INTERBUS-S functionality

Status display refers to INTERBUS-S functionality

Display status	Description
0	ACTIVE: INTERBUS-S in active status
1	USER: User error/parameterization
3	READY: INTERBUS-S in ready status
7	PF: Peripheral fault
8	DETECT: Diagnosis routine is active
b	Bus error Busmaster cannot access the bus (no idle state level) Possible causes: • Short circuit on the field bus • Terminating resistance not switched on • Terminating resistance has no voltage
E	Error on the interface module/hardware

2.2.8 Functional and Configuration Mode

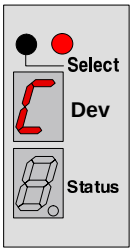
In functional and configuration mode, the following settings are available:

Display Dev	Display status	Description
1.	8.	Cancel fixation
2.	8.	Overlay non-remanent start-up, reset remanence error
3.	0. 1.	Release output Outputs disabled
4.	0. 1.	Serial interface has been assigned with BUEP19E Serial interface assigned by tracer (Job reporting)
5.	0. 1.	Cancel MPS of DP busmaster part selectively Cancel all stored data (PLC program, I/O configuration, IP configuration)
6.	8.	Software version of ZS550 (available from V1.1 or higher)

☞ **The active fixation and the disabled outputs are immediately displayed by the assigned LEDs.**

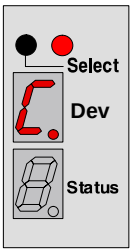
Select mode

★ Press the SELECT button until the upper display shows ”C”.



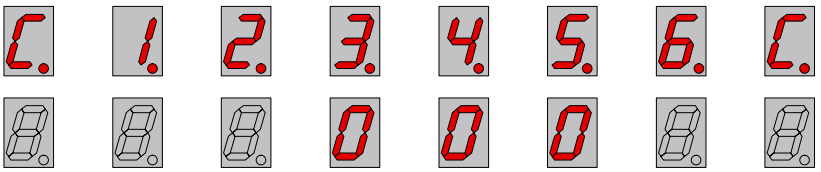
★ Use the Stop/Run switch within approximately 10 seconds in order to change to configuration mode. The upper display additionally shows a dot.

☞ **If you do not use the Stop/Run switch within approximately 10 seconds, the display ”C” disappears.**

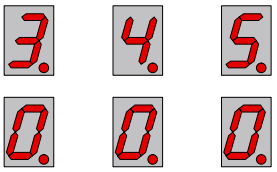


Select menu items

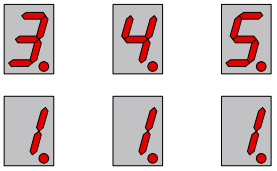
★ Press the Select button in order to select the requested menu item. The menu items 3, 4, and 5 are provided with further options.



★ Use the Stop/Run switch to continue with options. The lower display appears with a dot.



★ Press the Select button in order to select the requested option.



★ Use the Stop/Run switch to activate the option.

After making and activating the selection with the Stop/Run switch, the system immediately switches back to the display mode.

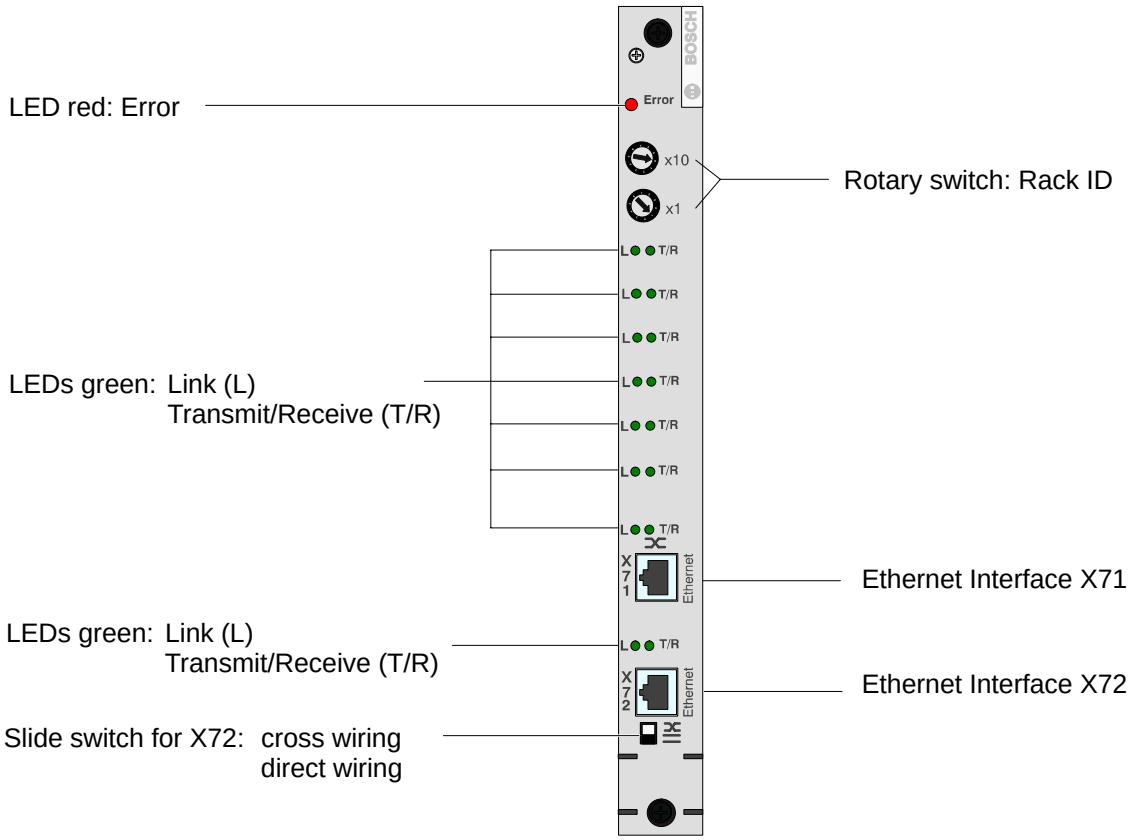
If no selection is made, it is possible to switch back to component code ”C” via the Stop/Run switch. If you operate the Stop/Run switch a second time, the configuration mode will be terminated. The display with the highest priority will be visualized.

2.3 CON550

The module CON 550 is an Ethernet switch for the CL550 system. It provides eight 10/100-Base-T interfaces with automatic recognition and automatic switching between the transfer rates:

- 2 interfaces on the frontside for communication with other stations in the network.
- 6 interfaces on the backside for communication with other modules of the basic device.

2.3.1 Operating Elements and Displays



The red Error LED is off during normal operation. After Power on, during the self test, it is lit. After a successful self test, the LED must go off, otherwise the module must be changed.

The rack ID of the CL550 is set with both the 10-steps rotary switches.

The eight Ethernet channels on the CON550 module have been assigned two LEDs each:

- The left LED (”L”) shows the physical connection to a data terminal (ZS550, external switch, etc.). It must always be lit.
- The right LED (”T/R”) shows the data traffic on the channel.

The slide switch determines whether the X72 connection is provided with a data terminal assignment (even: MDI) or a slide switch assignment (crossed: MDI-X).

2.4 IP Addressing

Essential tasks of project configuration are assigning and controlling IP addresses and setting the individual Ethernet parameters. This way, the different controllers and communication modules will be unambiguously assigned within a group of several manufacturing systems.

Each network card in the computer and the controllers is provided with its own IP address. It is 32 bit long and displayed in 4 group of figures that are divided by dots. Each group lies within a range of 0 to 255.

Example: 121.2.64.229

To this address, a subnetwork mask will be assigned. For more information regarding subnetwork masks, please refer to page 2–22.

An IP address is divided into a network address (Net-ID) and a node address (Host-ID). The network address identifies the relevant subnetwork. The node address serves for addressing a station within a subnetwork. This subnetwork will be determined via the subnetwork mask, please refer to page 2–22.

According to the size of the network, there are 5 address classes:

Class	Description	Address range
A	1 byte network address and 3 bytes node address	1.0.0.1 to 126.255.255.254
B	2 bytes network address and 2 bytes node address	128.0.0.1 to 191.255.255.254
C	2 bytes network address and 2 bytes node address	192.0.0.1 to 223.255.255.254
D	Special addresses: ● Loop back addresses ● Multicast addresses ● Broadcast address	 127.0.0.1 to 127.255.255.254 224.0.0.0 to 255.255.255.254 255.255.255.255
E	Reserved	

☞ **For addressing the communication modules, the IP addresses within the address ranges of the classes A, B, and C are suitable.**

☞ **Do not assign 0 or 255 as a node address (Host-ID), since 0 represents the Net-ID and 255 represents the broadcast address of the corresponding network.**

2.4.1 Subnetwork Mask

A subnetwork mask will be linked additionally to the IP address via which all communicating components in a network can be reached. It looks like an IP address, e.g. 255.255.0.0 could be a possible subnetwork mask.

The subnetwork mask must be equal for all stations in a network in order for them to know that they belong to the same network. The subnetwork mask determines the possible size of a network. I.e., that so-called subnetworks can be defined.

The CL550 operates two independent Ethernet interfaces in a controller: Frontside and Backside, please refer to page 2–21. In order to distinguish the physical access to the components, the two interfaces must be located in different subnetworks. The subnetwork mask, though, is identical for both interfaces.

☞ **In order to make unambiguous addressing possible, it is important that the subnetwork mask will be adjusted to the IP addresses of the front- and the backside.**

The subnetwork address for the frontside results from

- the IP address of the frontside and
- an AND operation with the subnetwork mask.

The subnetwork address for the backside results from

- the IP address of the backside and
- an AND operation with the subnetwork mask.

Adjusting the Subnetwork Masks

The following two examples explain the adjustment of the subnetwork mask.

Example 1:
Subnetwork mask suitable
Determination of subnetwork address frontside

Subnetwork mask	255.255.192.0	11111111.	11111111.	11000000.	00000000
IP address frontside	121.1.1.1	01111001.	00000001.	00000001.	00000001
Result of AND operation corresponds to subnetwork address	121.1.0.0	01111001.	00000001.	00000000.	00000000

Determination of subnetwork address backside

Subnetwork mask	255.255.192.0	11111111.	11111111.	11000000.	00000000
IP address backside	121.1.100.1	01111001.	00000001.	01100100.	00000001
Result of AND operation corresponds to subnetwork address	121.1.64.0	01111001.	00000001.	01000000.	00000000

With the subnetwork mask 255.255.192.0, the AND operation of the front- and the backside delivers different results. Front- and backside do not belong to the same subnetwork. The addressing is unambiguous. The interface is selected by comparing the target subnetwork with the existing subnetworks.

Thus, with the subnetwork mask 255.255.192.0, the following IP addresses can be addressed directly:

- For the frontside: 121.1.[0 to 63].x (x = 1 ... 254)
- For the backside: 121.1.[64 to 127].y (y = 1 ... 254)

Example 2:
Subnetwork mask not suitable

Determination of subnetwork address frontside

Subnetwork mask	255.255.0.0	11111111.	11111111.	00000000.	00000000
IP address frontside	121.1.1.1	01111001.	00000001.	00000001.	00000001
Result of AND operation corresponds to subnetwork address	121.1.0.0	01111001.	00000001.	00000000.	00000000

Determination of subnetwork address backside

Subnetwork mask	255.255.0.0	11111111.	11111111.	00000000.	00000000
IP address backside	121.1.64.1	01111001.	00000001.	10000000.	00000001
Result of AND operation corresponds to subnetwork address	121.1.0.0	01111001.	00000001.	01000000.	00000000

Do not use the subnetwork mask 255.255.0.0 because with the result of the AND operation front- and backside cannot distinguish. Front- and backside belong to the same subnetwork. Unambiguous addressing is not possible.

☞ **Also the local network card must present an IP address in the same subnetwork if the PC is to be linked directly to the subnetwork.**

Communication via the IP addresses will be established as follows:

- If the network stations are located in the same subnetwork, the communication packets will be exchanged directly.
- If the IP address is located in another subnetwork, the data packets will be forwarded via the router (computer that connects different network segments with each other). I.e., that if there is no router in the network, communication is not possible.

Example:

Computer address:	142.2.30.70	
Subnetwork mask:	255.255.0.0	
Subnetwork router address:	142.2.0.100	
Target address:	142.3.12.7	–> Data packet to router
Target address:	142.2.20.21	–> Data packet remains in its own subnetwork

3 Project Configurator

The project configurator is

- an editing program which can be called via the WinSPS utility program
- the tool that provides the link between project and network.

The prerequisite for calling the project configurator is a CL550 controller.

☞ **Prior to project configuration, the entire concept of the desired system should be ready.**

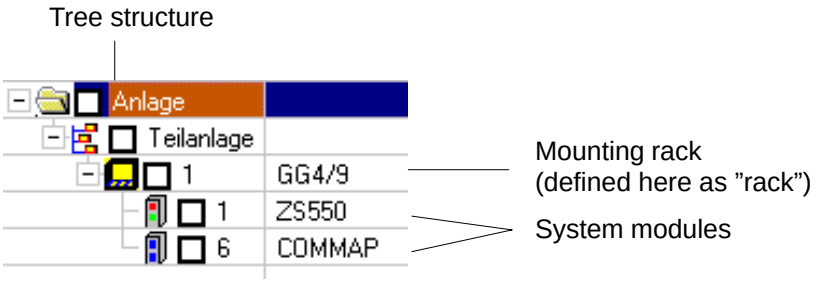
With the project configurator

- networked systems will be defined and processed
- several controllers that can communicate among each other will be put together in a group
- a configuration file will be created.

The controllers contain

- mounting racks that consist of ZS550 control units and that can be supplemented with COM-MAPs, system modules that are capable of TCP/IP communication.

For processing within the project configurator, a tree structure, i.e. an image of the system in form of a ”controller tree”, results from this hierarchic organization.



☞ **Descriptions of the COM-MAP module are not part of this manual. For further information, please refer to the manual of the COM-MAP module.**

In order to assign the different controllers and system modules unambiguously, the project configurator makes it possible to

- assign and control IP addresses
- to set the individual Ethernet parameters for subnetwork mask definition.

The project configurator allows

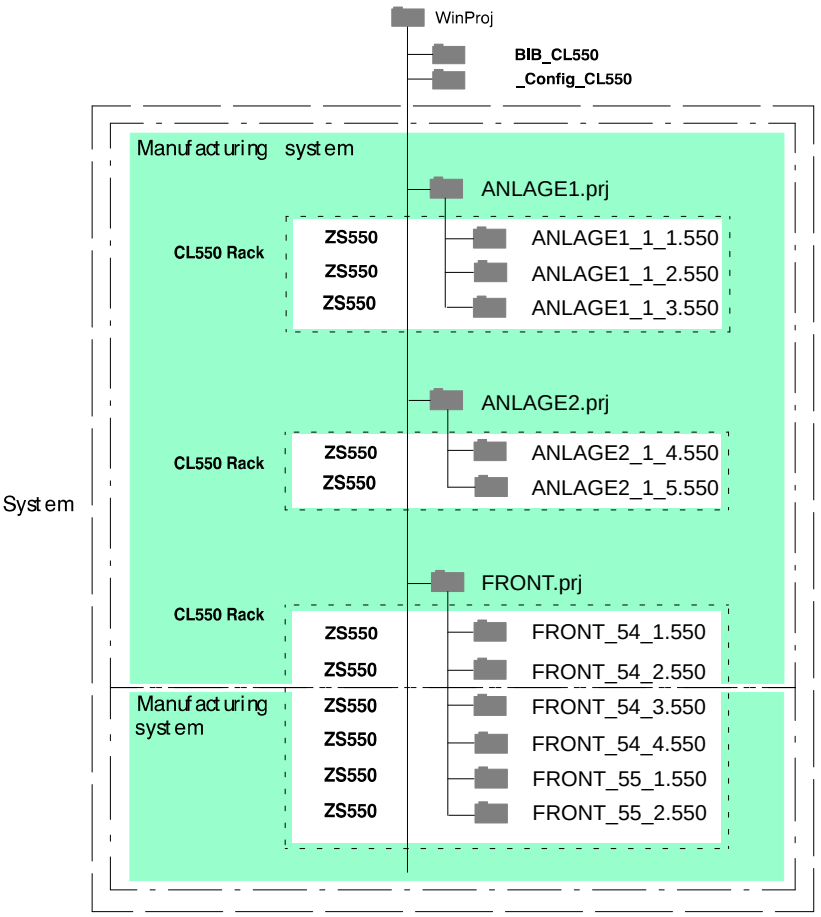
- safety measures via password assignment which makes safe access to the system and its components possible
- working with a fitting directory structure on the harddisk (via the tree structure), which serves as a basis for the administration of the PLC programs via WinSPS.

Via the project configurator the configuration file can be:

- created
- checked
- loaded
- unloaded
- compared
- documented.

3.1 System Configuration

3.1.1 Directory Structure



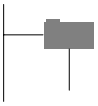
Definition of the Terms

System:	Group of several manufacturing systems
*.prj directory:	Project directory; can contain more than one controller (even if of different types)
Rack:	Group of several control files
Control file:	A ZS550 (ZS0 = default), COM-MAP (optional)

☞ **If the option "With system component structure" is selected and the different *.prj directories contain the same Rack_IDs as name parts, there will be double assignment errors.**

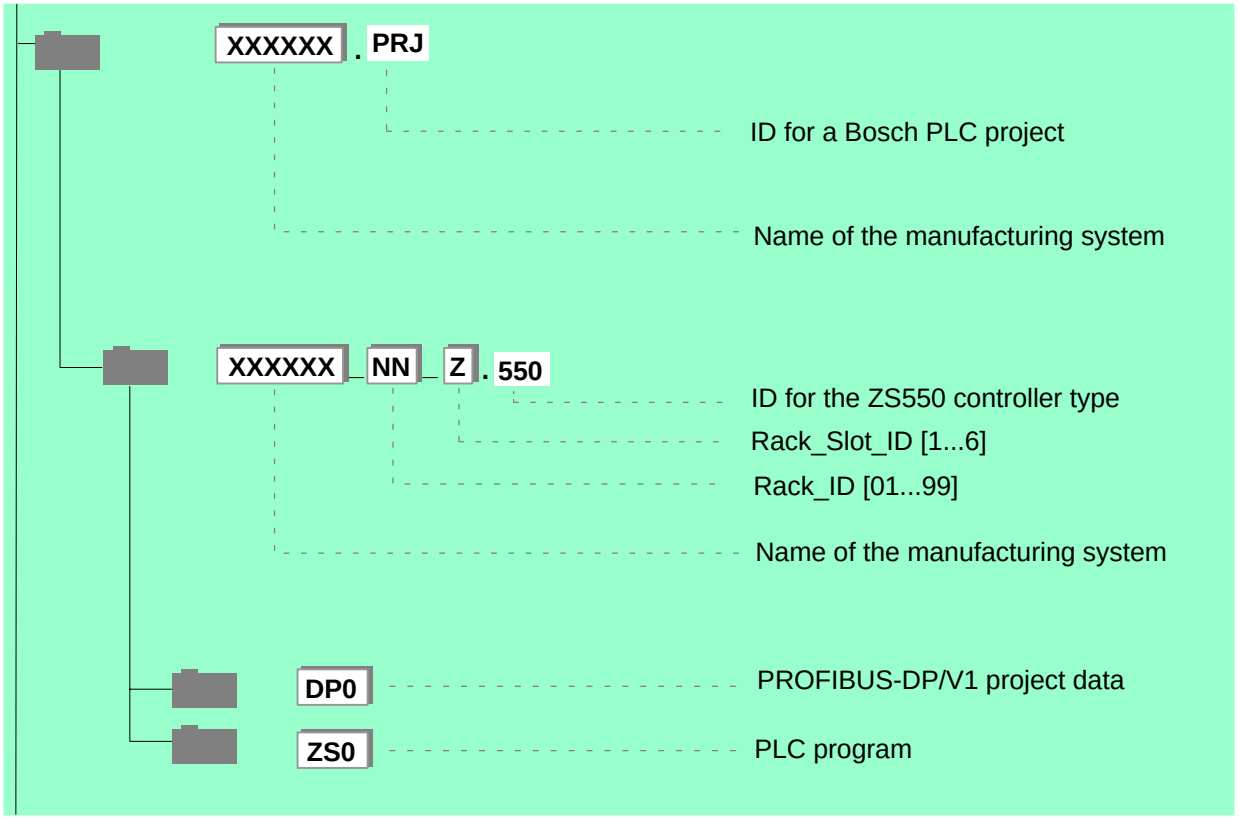
3.1.2 Structure of the Project Designations

Manufacturing System ID



The directory structure is a group of several CL550 racks for controlling a manufacturing system.

- Rack – 3 x ZS550 (Name_1_1.550)
  (Name_1_2.550)
  (Name_1_3.550)
- Rack – 2 x ZS550 (Name_1_4.550)
  (Name_1_5.550)
- Rack – 6 x ZS550 (Name_54_1.550)
  (Name_54_2.550)
  (Name_54_3.550)
  (Name_54_4.550)
  (Name_55_1.550)
  (Name_55_2.550)



Rack_ID

The Rack_ID is the address of a rack. On the CON550 module, it can be set via a rotary switch on the frontside [01 to 99] or without a CON550, it can be set via the DIP switches behind the power supply unit (see chapter 4, paragraph 4.2.1). Each Rack_ID can only be given once in a controlling system.

Rack_Slot_ID

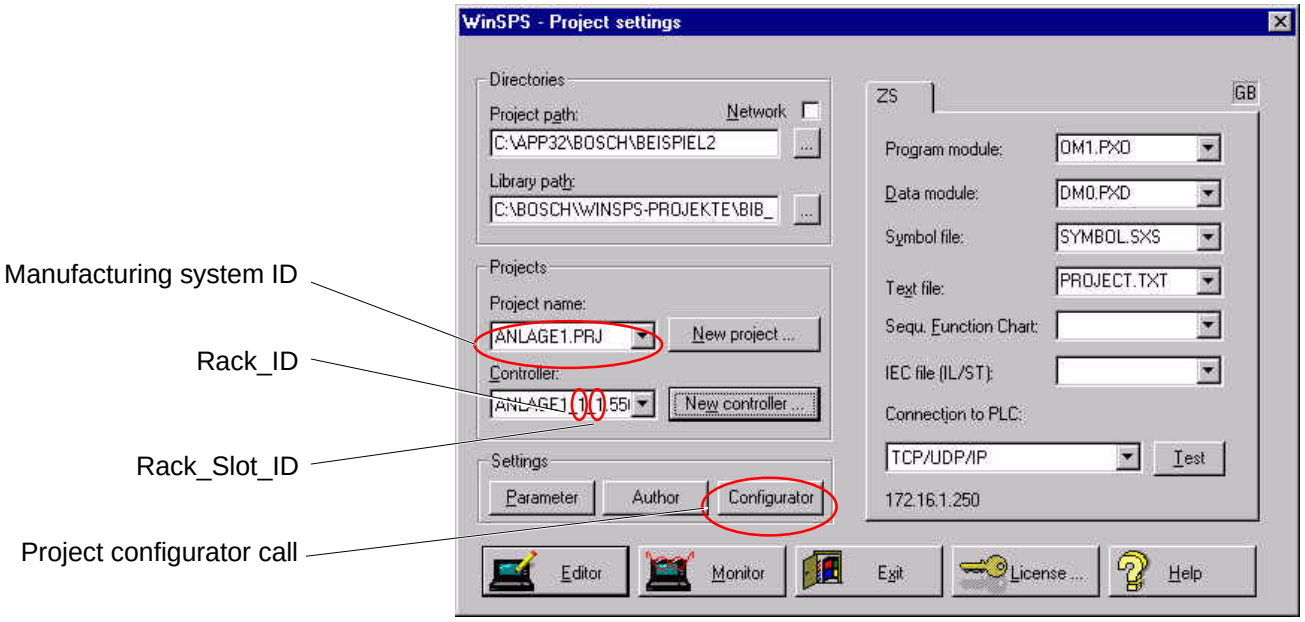
A Rack-Slot-ID describes the position of a system module within the rack. It is predetermined by the slot.

–	Slot 1, 2	NTx
Rack_Slot_ID 1	Slot 3	ZS550 or COM-MAP
Rack_Slot_ID 2	Slot 4	ZS550 or COM-MAP
Rack_Slot_ID 3	Slot 5	ZS550 or COM-MAP
Rack_Slot_ID 4	Slot 6	ZS550 or COM-MAP
Rack_Slot_ID 5	Slot 7	ZS550 module or COM-MAP module
Rack_Slot_ID 6	Slot 8	ZS550 module or COM-MAP module
————————	Slot 9	CON550 module

☞ **The Rack_ID 0 has already been reserved and shall not be assigned otherwise. The recognition of the Rack_ID 0 during run-up leads to an error message.**

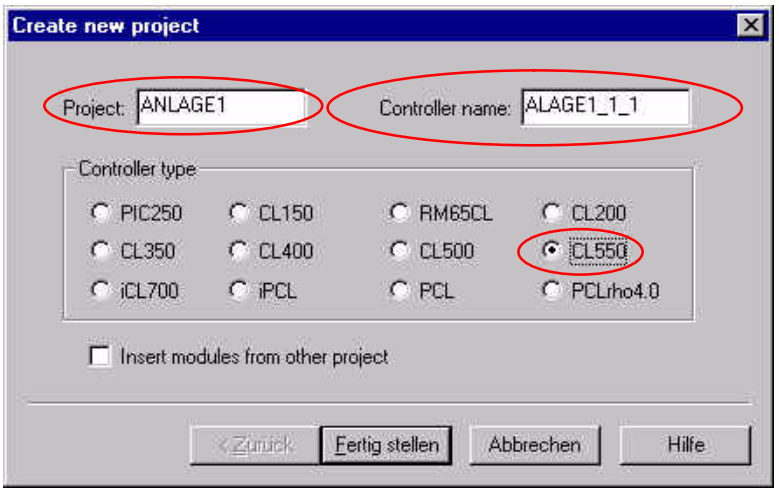
3.1.3 WinSPS Project Settings

The WinSPS utility program serves to set the project settings and to call the project configurator. The dialog box displays the project settings.



After creating the project path and the library path by using the Windows file management program ”Explorer”, new projects and the controllers contained therein can be created in the WinSPS utility program.

Use the description system listed under chapter 3.1.2.

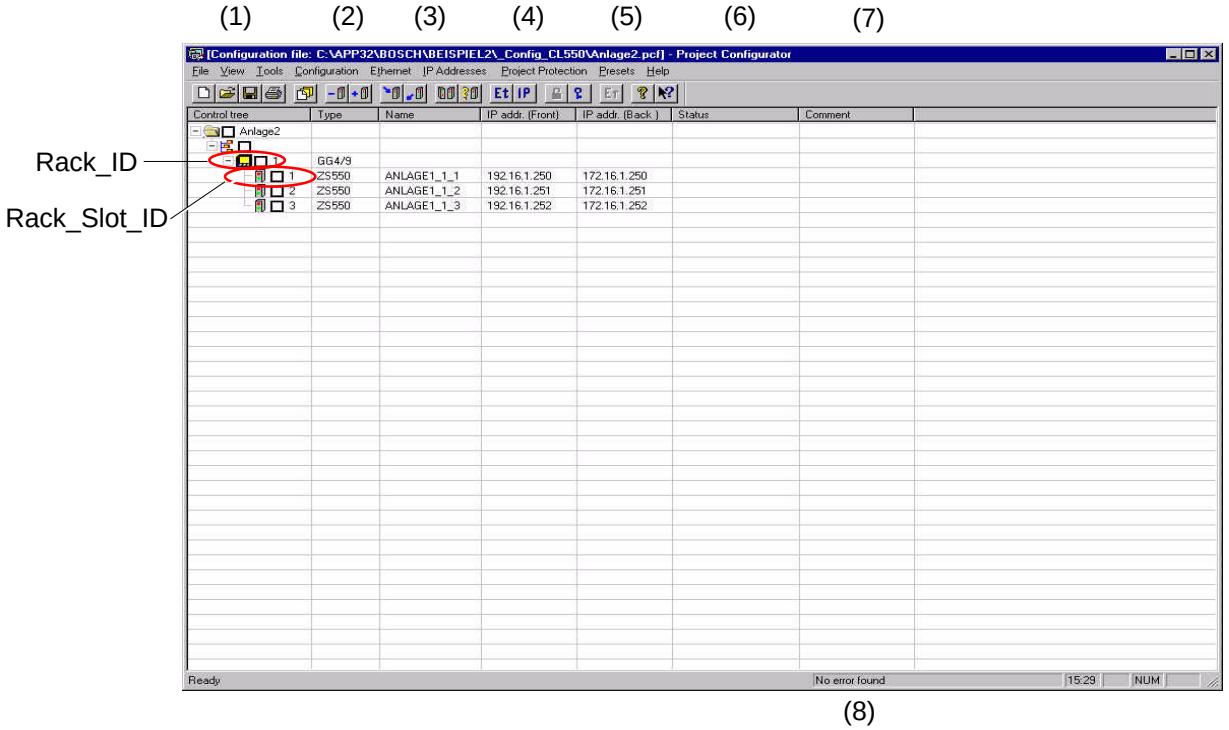


3.1.4 Create Configuration File

For each system, a configuration file which has been adapted to the system modules in the local network must be created. This configuration file considers the distinctive features in the local network, especially when assigning IP addresses.

Main Window of the Project Configurator

The main window of the project configurator contains all important information regarding the components included in the configuration file. The configuration file will be displayed as a ”controller tree” as part of a table. This table consists of 7 columns containing different information.



Definition of the Columns

Controller tree (1), obligatory input (1)
In the first column, insert the structure of the manufacturing systems that are to be configured. The manufacturing systems consist of racks that contain the system modules. The racks are unambiguously assigned to a manufacturing system by the **Rack_ID** [01 to 99].

Type (2), obligatory input
In the second column, insert the type of the components. At the moment, there are three different types available:

- GG4-9
- ZS550
- COM-MAP

Name (3), optional
In addition to the system, also the component types can have names that are defined by the user. The name can e.g. create the link between the directory structure and the WinSPS software. The fields should have the names of the directories and designations for filing the PLC programs as determined in chapter 3.1.2.

IP address frontside (4), obligatory input
The fourth column contains the IP addresses for the Ethernet interfaces on the frontside. They can be changed by the user, but only numbers in the IP address range defined by the user are accepted. See chapter 3.3 ”Address Assignment”.

IP address backside (5), obligatory input
In the fifth column, the IP addresses for the Ethernet interfaces on the backside must be listed and edited. They can be changed by the user, but only numbers in the IP address range defined by the user are accepted. See chapter 3.3 ”Address Assignment”.

☞ **In order to provide a perfect communication between the single CL550 controllers, their IP addresses must be assigned correctly.**

Status (6)
The sixth column contains the error/status messages of the single components.

Information (7), optional
The seventh column contains additional information regarding the corresponding component and a more detailed description of the system. The information is stored in the configuration file and loaded into the hardware.

Status line (8)
The status line displays more detailed, context-related explanations, descriptions, and error messages regarding the selected or processed operations.

You can create a configuration file via:

- Menu FILE ▶ CREATE CONFIGURATION FILE
- Toolbar:
  Click on

☞ **The configuration files are filed as XXXXXX.pcf in the _Config_CL550 subdirectory.**

The project configurator provides the following possibilities for creating a configuration file:

- by creating configuration offline
- with system component structure
- by accepting online data
- by creating configuration from the directory structure

Create Configuration Offline (Default)

When creating a configuration file offline, manually enter into the ”new system” dialog box:

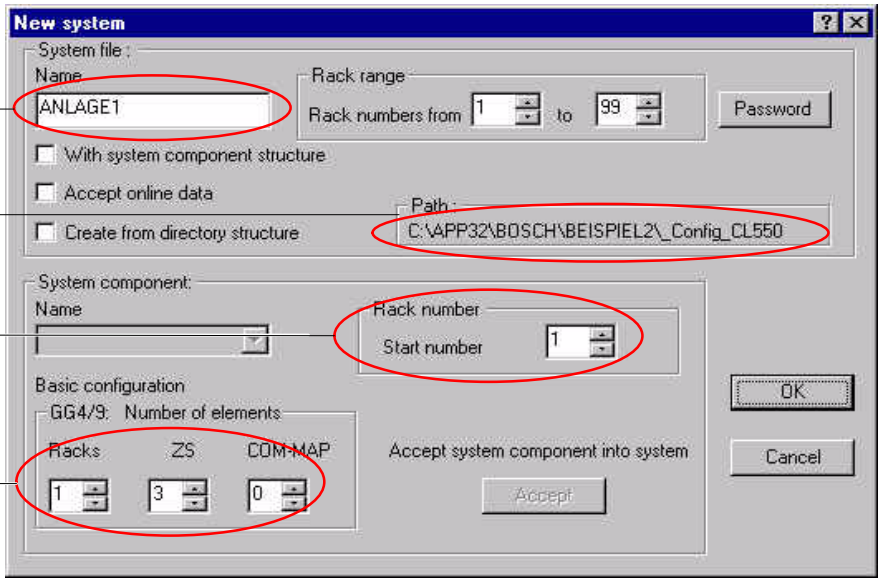
- the file name for the configuration file
- a starting number for the first Rack_ID
- the basic configuration (Racks/ZS)

File name

Folder for configuration files

Number for the first rack

Basic configuration

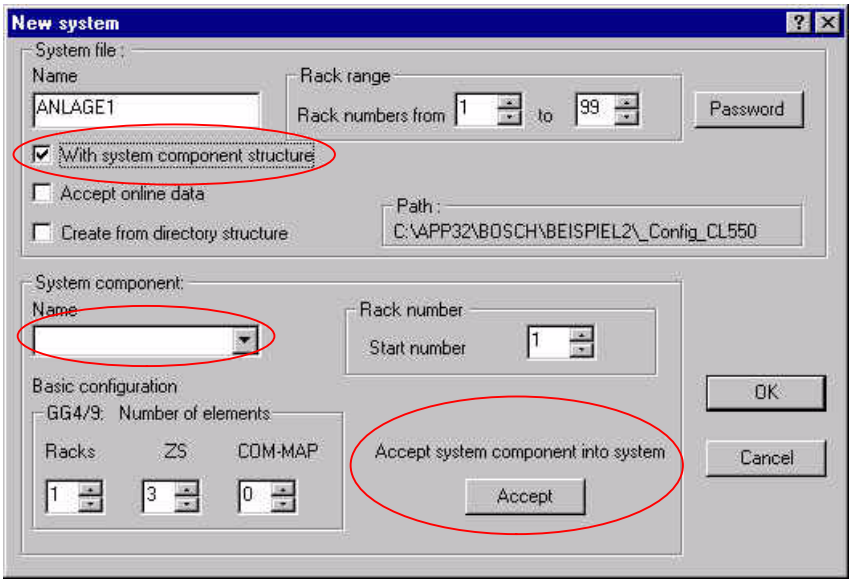


After leaving the dialog box by clicking ”OK”, the contents of the current system will be created in the main window of the project configurator.

With System Component Structure

Dividing a system in several subsystems is possible. Subsequently, several subsystems can be compounded into one entire system. Advantage: Single system parts can be started one after the other.

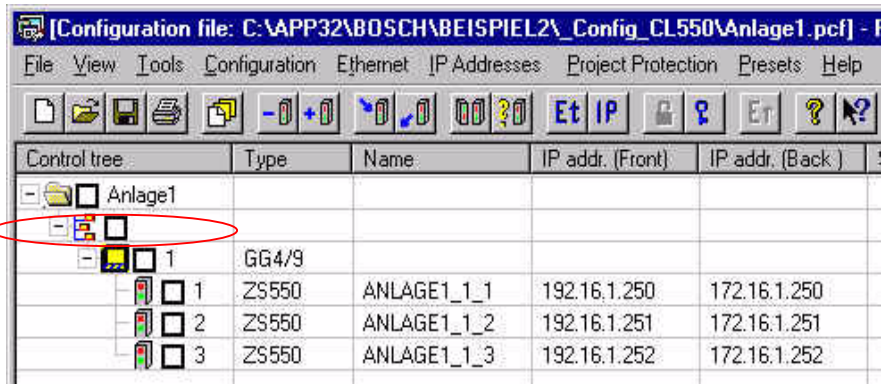
☞ **Once you have chosen the option ”with system component structure”, this setting cannot be altered for the current file.**
When several subsystems are put together, all files must be provided with this option.



★ Enter name of the subsystem.

★ Confirm with ”Accept”.

Name of the subsystem



Insert and Delete

After creating the basic configuration, the configuration file can be adapted by **insert**ing and **delet**ing components.

★ Insert subsystem

- Select line via this icon. 
- Insert via icon or via menu TOOLS ▶ INSERT or symbol. 

★ Insert rack

- Select line via this icon. 
- Insert via icon or via menu TOOLS ▶ INSERT or symbol. 

★ Insert system module

- Select rack into which the system module shall be inserted. 

- Insert via icon or via menu TOOLS ▶ INSERT or symbol. 

★ Delete subsystem, rack, or system module

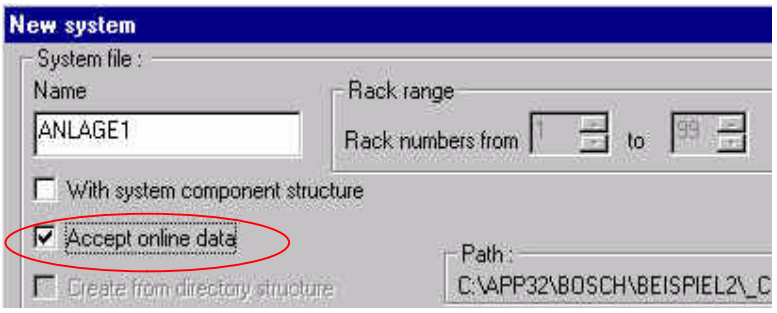
- Select line in which the subsystem, the rack, or the system module is located.
- Delete via icon or via menu TOOLS ▶ DELETE or symbol. 

☞ **After creating the configuration file for the first time or after inserting subsystems, racks, and/or system modules, some columns of the main window will be assigned with default values which can be altered later on.**

Create Configuration Online

For an already existing controllers group of CL550 system modules, the configuration of the system can be subsequently read out (created online).

☞ **The IP addresses do not have to be assigned yet. The controllers group is identified by the Rack_IDs/Rack_Slot_IDs.**

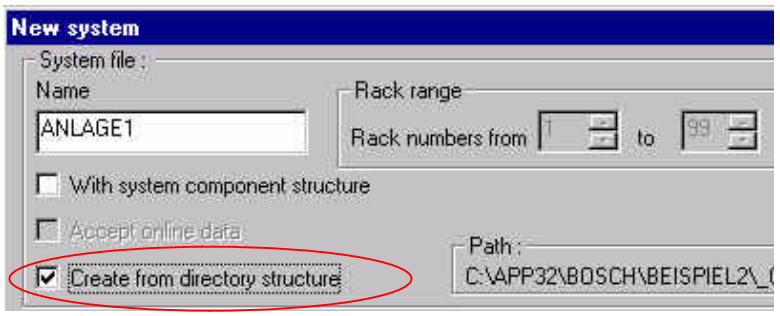


If you select the online function, a broadcast command (general broadcast) is sent to all Rack_IDs and Rack_Slot_IDs. Information about system modules that have responded to the broadcast command will be collected. The controller tree of the read-out configuration will be created and graphically displayed in the main window of the project configurator.

☞ **Subsequent insertion and deleting of components – as in offline operation – is possible.**

Create Configuration from the Directory Structure

The configuration file can be created by reading out the directory structure from the harddisk of the programming PC.



When creating the directories, e.g. when filing projects with the WinSPS programming tool, the specifications must be complied with, see also chapter 3.1.3.

For creating a controller tree, the directory names ”name.550”, the Rack_ID included in the ”name” and the Rack_Slot_ID as well as the identification for the manufacturing system will be read out.

If you have additionally selected the option ”with system component structure”, the names of the prj.-directories will be accepted as names of the subsystems.

☞ **Subsequent insertion and deleting of components – as in offline operation – is possible.**

3.1.5 Check Configuration File

The currently processed configuration can be checked for plausibility.

- Insert via menu PRESETS ▶ CHECK or symbol. 

The following is checked:

- IP addresses and Ethernet interface on the front side and on the back side
- Rack_ID
- Rack_Slot_ID

Under menu item ”Presets”, the user can additionally activate the following check options:

- System module, rack, check *prj directory or the entire system whether the frontside IP addresses are located in the same subnetwork.
- Check the entire system whether the backside IP addresses are located in the same subnetwork.

☞ **In case of complex configurations, checking the overall configuration may take some time.**

Following the check, entries with a fault are marked by a color. The status text of the main window contains the pertaining fault text giving a detailed description of the fault.

You may display the next faulty entry via:

- Menu TOOLS ▶ GO TO NEXT ERROR (F4)
- Function key F4
- Symbol 

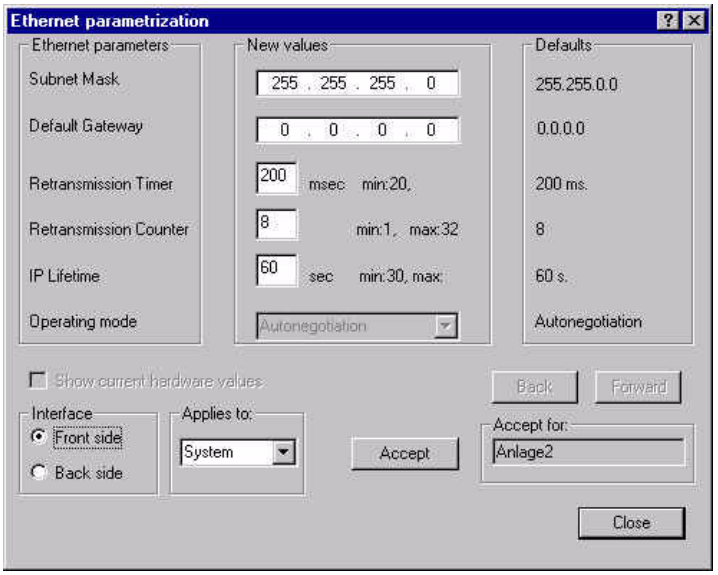
3.1.6 Load Configuration File

Prior to the actual loading process, the following presettings need to be checked or set up initially:

- Ethernet parameters
- Communication channel

Check Ethernet parameters

★ Check parameters via menu ETHERNET ▶ EDIT PARAMETERS or symbol.

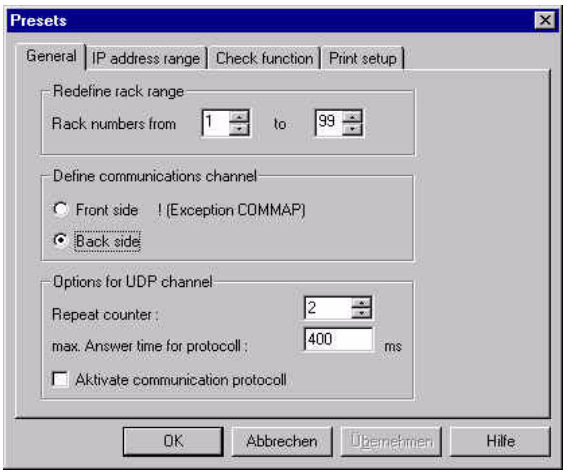


☞ **The communication parameters for the Ethernet interfaces on the frontside and on the backside have to be set in the dialog box as determined in Section 3.2.**

Select communication channel for the loading process

Loading can be performed either via the Ethernet interface on the frontside of the ZS550 module which is totally integrated in the system network and prescribed for programming or via the Ethernet interface on the backside of the CON550 module.

★ Select menu PRESETS.



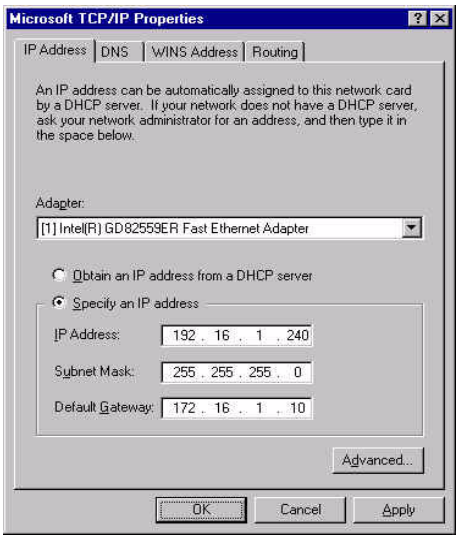
UDP channel options:

- Retransmission counter indicates how many retransmissions of a telegram are admissible.
- Maximum response time per protocol indicates the time in ms which passes when there is no reaction until the telegram is repeated.

★ Select communication channel in the dialog box.

Check or set the IP address for the programming device

The IP address of the programming device has to be located in the same subnetwork as the IP address of the selected communication channel (frontside or backside Ethernet interface) of the CL550 system.



★ Set the IP address of the programming device in the dialog box ”Microsoft TCP/IP Properties” in the WinNT operating system.

Loading procedure

Each loading procedure consists of the following steps:

- Check the content of the configuration to be loaded
- Check and load deviating IP addresses
- Load the configuration file including module names and comments
- Load the Ethernet parameters

☞ **The loading of faulty IP addresses and Ethernet parameters may affect other system modules which are already communicating and lead to unforeseen complications. It is important to proceed deliberately and carefully. For information on the assigning of IP addresses, see 3.3.**

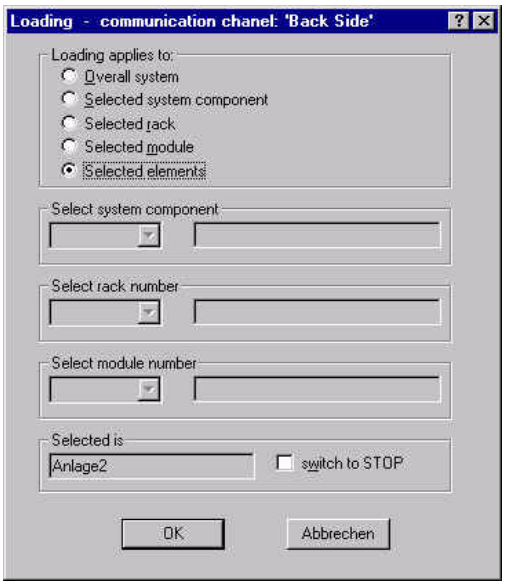
★ Start loading procedure via menu CONFIGURATION ▶ LOAD

The loading procedure may be selected for the following components:

- Overall system
- Selected system component
- Selected rack
- Selected module
- Selected elements

☞ **Always activate ”switch to STOP”. Otherwise, new or changed IP addresses cannot be loaded.**

Each system module that is addressed returns its status. This is entered in the status line of the main window.



Select loading process

- In case of overall system: no further entries necessary
- In case of loading process for system component: select system component
- In case of loading process for rack: select system component and Rack_ID

- In case of loading process for module: select system component, Rack_ID and Rack_Slot_ID
- In case of loading process for selected elements: mark the component(s) (Rack_ID, Rack_Slot_ID) the loading process is performed for in the main window of the project configurator.

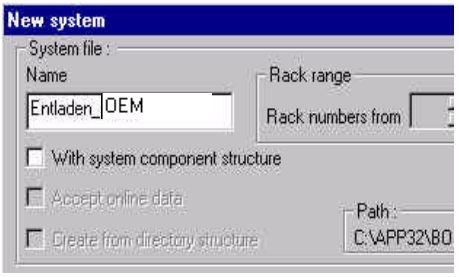
★ Load current configuration via symbol.

3.1.7 Unload Configuration

The configuration can be read out from a controllers group of CL550 system modules located in a logical network. Via ”broadcast”, the IP addresses, the configuration file and all Ethernet parameters as well as the status of each responding system module are read out.

★ Start unloading via menu CONFIGURATION ▶ UNLOAD

★ Enter name of the configuration file in the dialog box. A configuration file is overwritten or a new configuration file is created in accordance with the entered file names.



★ Unload configuration via symbol.

☞ **It is not possible to check completeness, because via ”broadcast” only the system modules in operation and located in the same subnetwork will respond.**

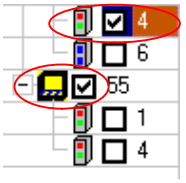
3.1.8 Compare

☞ **The function ”compare” is always related to the configuration file that is currently being processed.**

- Simple comparison configuration/PLC:
  Quick overview of differences between the current and actually loaded configuration.
- Exact comparison configuration/PLC:
  Precise overview of differences between the current and actually loaded configuration.
- Comparison configuration/file:
  Precise overview of differences between the current and a further configuration file.

Simple comparison configuration/PLC:

★ Mark components to be compared in the main window.

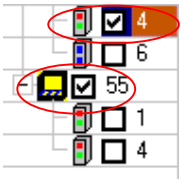


★ Start comparison via menu CONFIGURATION ▶ COMPARE ▶ COMPARE CONFIGURATION <–> PLC (SIMPLE) or symbol.

- All system modules existing only in the network will be marked in color.
- If the read out Rack_ID is in conformity with the Rack_ID of the configuration file, the system modules with an own Rack_Slot_ID will only be inserted if they do not exist in the configuration file.
  - If the read out Rack_Slot_IDs have already been assigned, the system modules found are inserted in the rack using the available Rack_Slot_IDs.
- If the found Rack_ID is not present in the configuration file, a new rack including all system modules is added to the system.
  - All components which cannot be interpreted are additionally marked with a question mark.
- Differences between system modules existing on both sides are listed in the status column, separated by commas.

Exact comparison configuration/PLC:

★ Mark components to be compared in the main window.



★ Open ”comparison” window via menu CONFIGURATION ▶ COMPARE ▶ COMPARE CONFIGURATION <–> PLC (EXACT).

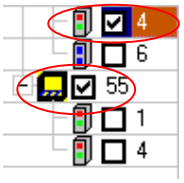
★ Start comparison via ”Start”.

In the window ”Compare” the conformities or faults are listed.

- The columns Rack Id and Mod. Id (Rack_Slot_ID) show the component being examined.
- The columns element shows in which parameter there is a difference; e.g. the IP address appears if differences in IP addressing are found.
- The column value (reference) shows the content of the currently displayed configuration file.
- The column value (target) shows the content from the network.
- The column status shows whether the content is identical or not identical.

Comparison configuration/file:

★ Mark components to be compared in the main window.



★ Open comparison window via menu CONFIGURATION ▶ COMPARE ▶ COMPARE CONFIGURATION <–> FILE (EXACT).

★ Select file for comparison.

★ Start comparison via ”Start”.

In the window ”Compare” the conformities and faults are listed.

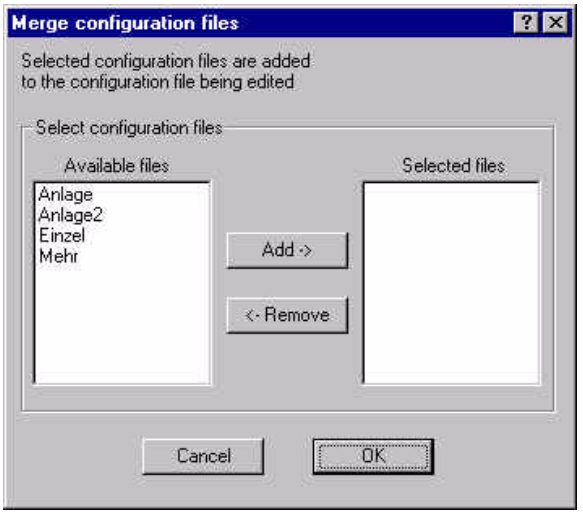
- The columns Rack Id and Mod. Id (Rack_Slot_ID) show the component being examined.
- The column element shows in which parameter there is a difference; e.g. the IP address appears if differences in IP addressing are found.
- The column value (reference) shows the content of the currently displayed configuration file.
- The column value (target) shows the content of the second file.
- The column status shows whether the content is identical or not identical.

3.1.9 Merge Configuration Files

When processing configuration files, several components can be created and subsequently compounded into one entire system. This procedure allows for the stepwise commissioning of individual system parts.

☞ **It is only possible to merge files with the identical options ”with system component structure” or ”without system component structure”. These options are determined when a new configuration is created and cannot be changed, see page 3–10.**

★ Merge configuration files via FILE ▶ MERGE CONFIGURATION FILES.



- Available files:
  All files existing in the _Config:_CL550 directory with the identical option ”with system component structure” or ”without system component structure” as the current configuration file.

★ Mark files.

★ Move files to the right hand side using ”Add”. Undo this using ”Remove”.

★ Add files to the current configuration file using ”OK”.

☞ **The system component structure – if it exists – will be maintained after the files have been merged.**

3.1.10 Document Configuration File

★ Start documentation via menu FILE ▶ PRINT or symbol. 

The following options may be selected in the dialog box ”print configuration file”:

- Overall system
- Selected racks
- Version with Ethernet parameters
- Version without Ethernet parameters

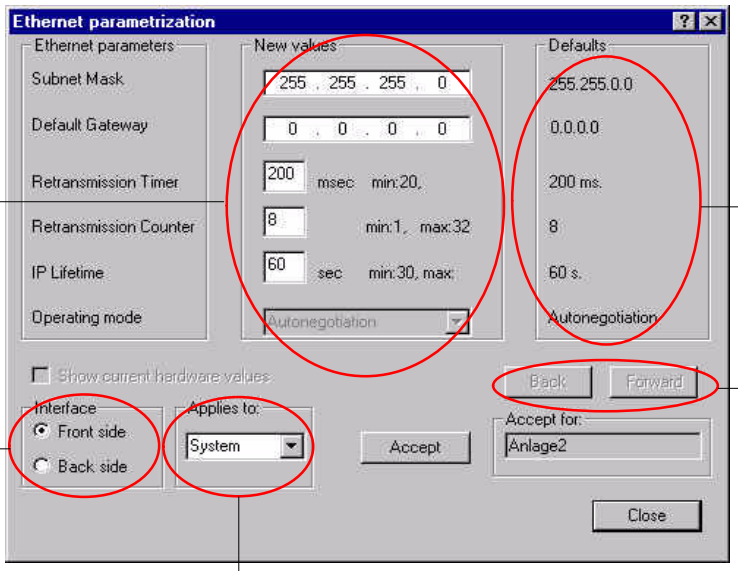
3.2 Editing Ethernet Parameters

In each new system, standard parameters (default values) are assigned to the Ethernet interfaces frontside and backside. In a dialog box, the user can adapt these values to his communication requirements.

The changes can be made for:

- the overall system
- a subsystem (system component)
- a rack
- a module

★ Ethernet parameters are processed via menu ETHERNET ▶ EDIT PARAMETERS or symbol.



Editing Ethernet parameters

Standard setting Ethernet parameters

Scrolling through the system components

Selection interface Frontside or backside

Selection system or system components

- Subnetwork mask:
  The subnetwork mask can only be set for the whole system. To change the subnetwork mask, it is necessary to ”applies to system”. For detailed information regarding subnetwork masks, please refer to Chapter 2, Section 2.4.1.
- Default gateway:
  Gateways and routers are used for communication across network borders. This allows for e.g. teleservice and remote diagnosis. If a component is used for these functions, its IP address has to be located in the same subnetwork as the IP addresses of the automation components using this gateway/router.
- Retransmission timer.
  Time in ms until retransmission of a telegram on IP level when there is no reaction.
- Retransmission counter:
  Number of admissible retransmissions of a telegram.

- IP lifetime:
  Before telegrams can be transmitted to a network station, it is necessary to know its MAC address. The relation between IP address and MAC address is determined via an ARP telegram and stored in a list. The IP lifetime indicates the maximum time this relation is stored in the list after the last data traffic.
- Mode of operation:
  The data exchange between two stations can be performed in the modes of operation **autonegotiation**, **full duplex** or **half duplex** in transmission modes 10 Mbit/s / 100 Mbit/s. Advantage full duplex: the simultaneous transmission of both stations does not lead to a collision. In mode of operation autonegotiation, the best mode of all stations is determined automatically.

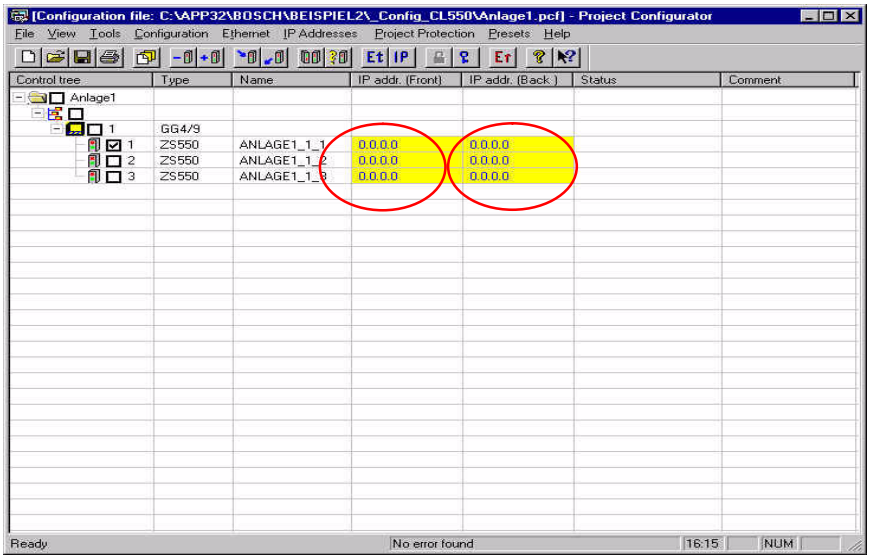
If a module has been selected in the field ”Applies to:” the current Ethernet parameters of the selected module are displayed under ”Defaults” (or the message ”no connection”, if it cannot be reached), if the option ”Show current hardware values” has been activated.

☞ **All Bosch CL550 modules support the full duplex mode of operation with 100 Mbit/s transmission mode.**

3.3 Address Assignment

When a configuration file is first created by the project configurator, the ZS550 modules have no IP addresses (display: 0.0.0.0). For detailed information regarding IP addresses, please refer to Chapter 2, Section 2.4.

☞ **The IP addresses are determined by the network administrator.**



★ Assign IP address frontside.

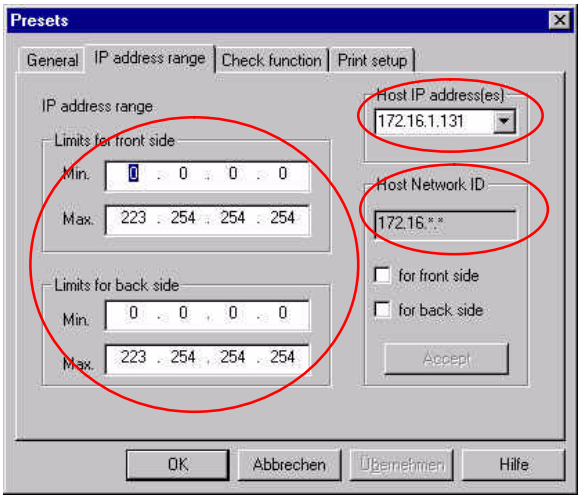
★ Assign IP address backside.

The user having assigned the IP addresses of the frontside and backside, the connection setup is realized via the IP addresses.

3.3.1 Determine IP Address Range

”Presets/IP address range” facilitates the definition of the correct IP address range.

★ Define the IP address range via menu PRESETS ▶ IP ADDRESS RANGE.



- Limit values for frontside/backside:
  Restrict IP address range for frontside and backside. Only IP addresses that are within these limits will be accepted.
- Host IP address(es):
  Is related to the Ethernet card in the PC. In case of several entries, the PC contains further components capable of communication.
- Host network ID:
  Host IP address AND creates a link with the pertaining subnetwork mask. ”**” represents the possible address range of the subnetwork.

★ Mark components that will be assigned IP addresses in the main window.

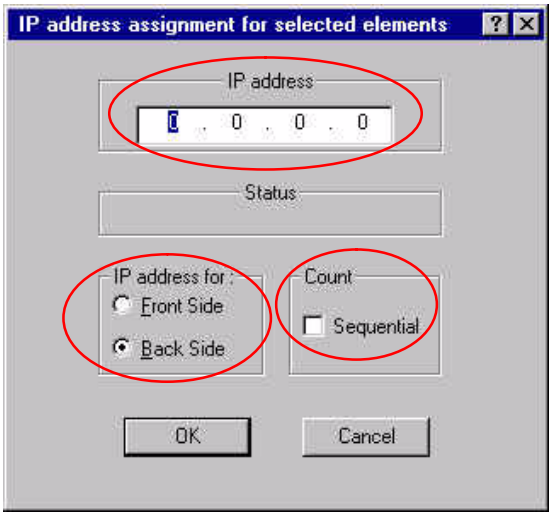
★ Enter limit values for the frontside and backside interface. Thus, only IP addresses that are within these limits will be accepted.

★ Select frontside or backside.

★ Accept limit values using ”Accept”.

3.3.2 IP Address Assignment for Selected Elements

- Assign IP addresses to several modules via symbol.



★ Enter start address.

★ Select automatic IP address assignment for frontside or backside.

★ Activate consecutive counting mode to assign consecutive addresses in the last block of 4 IP addresses.

3.4 Project Protection

3.4.1 Changing of System Password

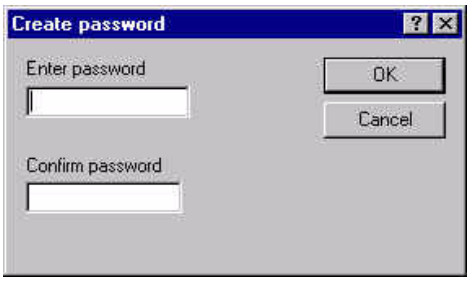
The system password serves to protect a configuration file.

In case of a protected file, the following may not be changed:

- The current configuration file
- The contents of the system modules

Initial creation

★ Create password via menu PROJECT PROTECTION ▶ CHANGE SYSTEM PASSWORD.



★ Enter password.

★ Confirm password.

Change or delete

★ Change or delete password via menu PROJECT PROTECTION ▶ CHANGE SYSTEM PASSWORD.

★ Enter old password.

★ Enter new password or leave field empty to cancel system protection.

☞ **After entering, changing or deleting a password, this will initially be accepted for the current configuration file only.**
To update the system protection in the entire system, it is necessary to perform the loading procedure. It is necessary to select the loading option ”Overall system” to make sure that the password is updated in all system modules. Only then is access protection ensured for the overall system.

3.4.2 Changing of System Protection

- Release or disable protection option ”Change overall system” via menu FILE ▶ CHANGE SYSTEM PROTECTION or symbol.

★ Enter password.

★ Confirm with OK.

★ Select protection option.

Notes:

4 Commissioning Step by Step

The commissioning step by step describes the connection of a CL550 via the TCP/IP protocol. The set values and addresses are transmitted into the system controller using the project configurator.

Communication via the TCP/IP protocol takes place in a

- single processor system via the ZS550, see page 4–3.
- single processor system via the CON550 module, see page 4–7.
- multiple processor system via the respective ZS550, see page 4–11.
- multiple processor system via the CON550 module, see page 4–18.

Prerequisites

The following prerequisites have to be fulfilled for commissioning step by step:

- The components are physically connected with each other. For the ZS550 it is necessary to take care that:
  - the data terminal equipment (PC, ZS550) has an MDI port
  - switches, hubs etc. have MID-X ports and a reversible port.

Depending on the communication parameters, a patch or cross-over cable has to be used.

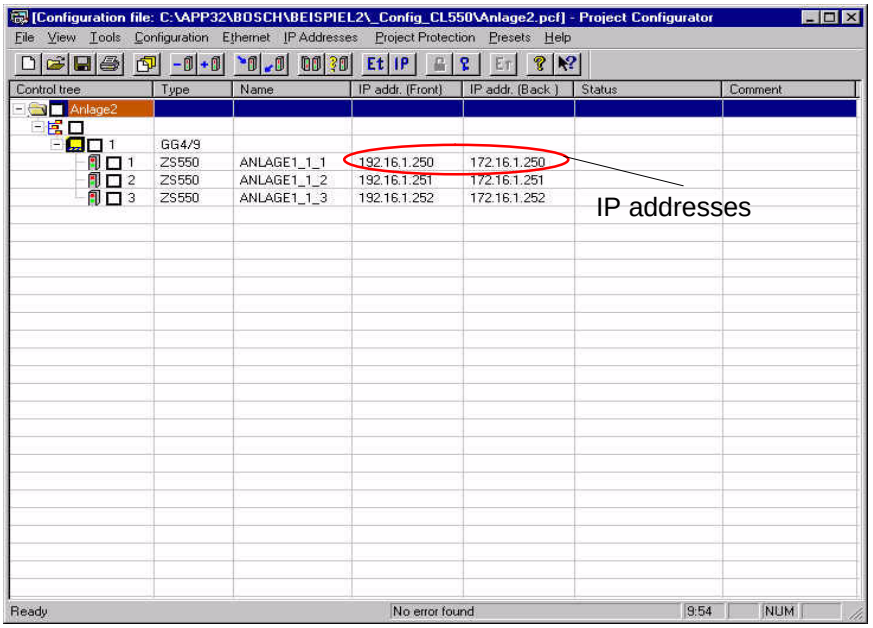
	Device 1		
		MDI	**MDI-X**
Device 2	**MDI**	Cross-over cable	Patch cable
	MDI-X	Patch cable	Cross-over cable

- The configuration file is defined in the project configurator
- The configuration of the PROFIBUS-DP is created in WinDP
- The PLC program is created with WinSPS

4.1 Generally Applicable Settings

Presetting TCP/IP addresses

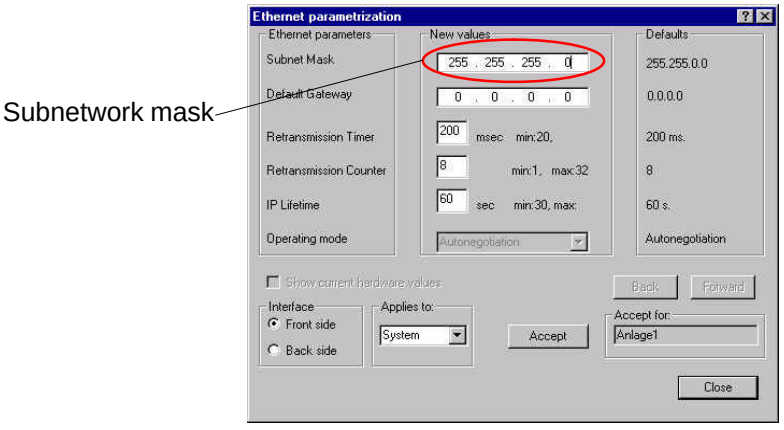
For commissioning of a ZS550, the IP addresses of the frontside and backside of the ZS550 have to be located in different subnetworks.



☞ **The IP addresses are assigned by the network administrator.**

Presetting subnetwork mask

The settings of the subnetwork mask depend on the subnetwork class used.

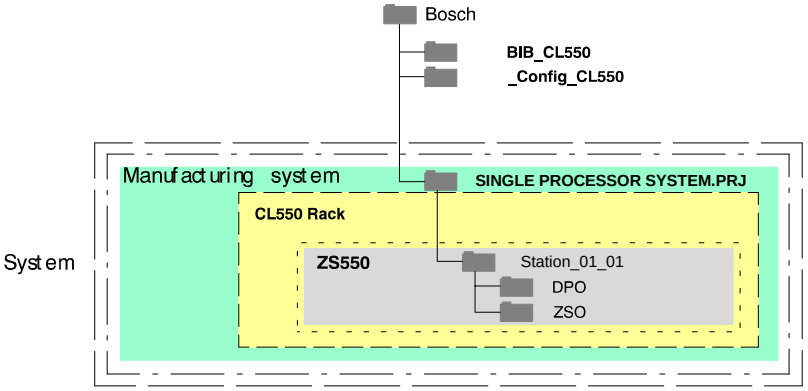


☞ **The subnetwork masks are assigned by the network administrator. For information on subnetworks, see Section 2.4.1.**

4.2 Commissioning of a Single Processor system

A single processor system is connected via the CON550 module or via the ZS550.

Directory Structure

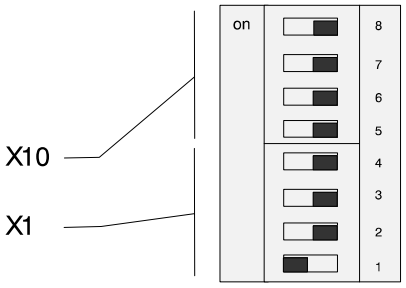


4.2.1 Connection via the ZS550

Presetting Rack_ID

The Rack_ID (rack address) has to be set prior to commissioning. The Rack_ID is the identification number of a rack [01 to 99]. Each Rack_ID can only be given once in a controller system.

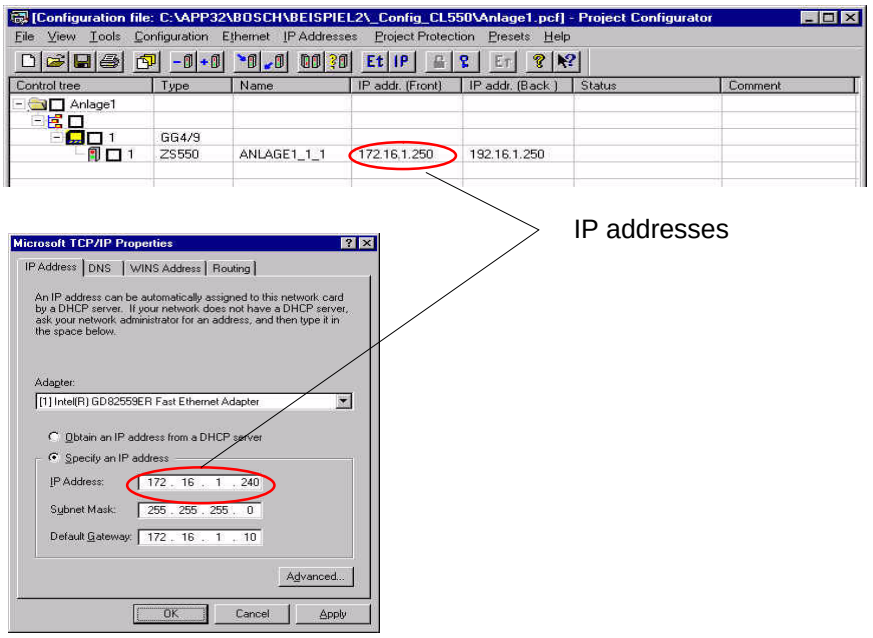
- Without the CON550 module, the Rack_ID is set at the DIP switches on the master board at the back of the power supply in BCD code.



- With the CON550 module, the Rack_ID is set via rotary switches on the frontside.
  The settings of the DIP switches are thus overwritten.

Setting TCP/IP addresses

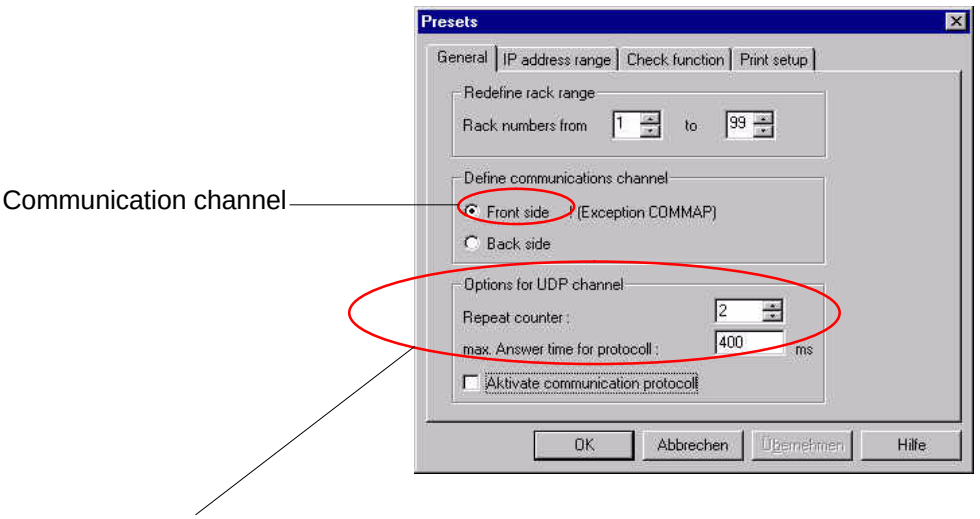
To establish a communication, the IP addresses of the programming device/ the network PC and the IP address of the ZS550 frontside have to be located in the same subnetwork.



☞ **The IP addresses are determined by the network administrator.**

Presetting communication channel

★ Determine communication channel ”frontside” in the project configurator under menu PRESETS.

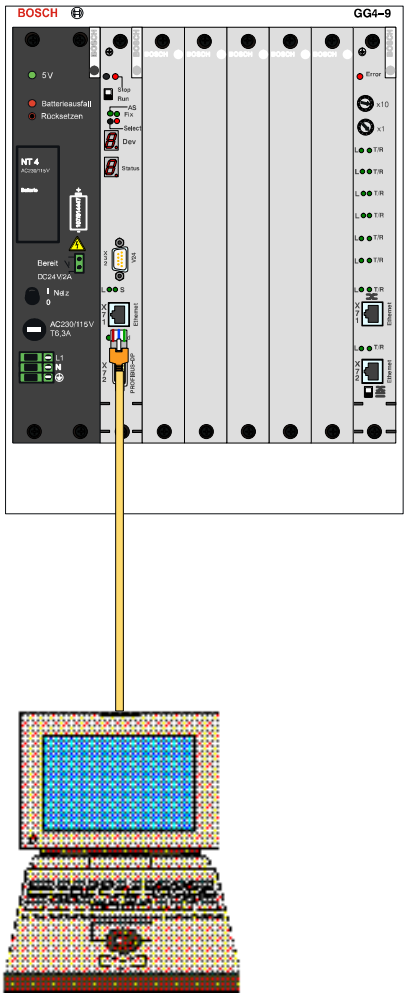


UDP channel options:

- Repeat counter indicates how many retransmissions of a telegram are admissible.
- Maximum response (answer) time per protocol indicates the time in ms which passes when there is no reaction until the telegram is retransmitted.

Connection to a programming device

The ZS550 and the programming device communicate via a cross-over cable. This cable connects the Ethernet interface X71 on the ZS550 with the network card in the programming device.

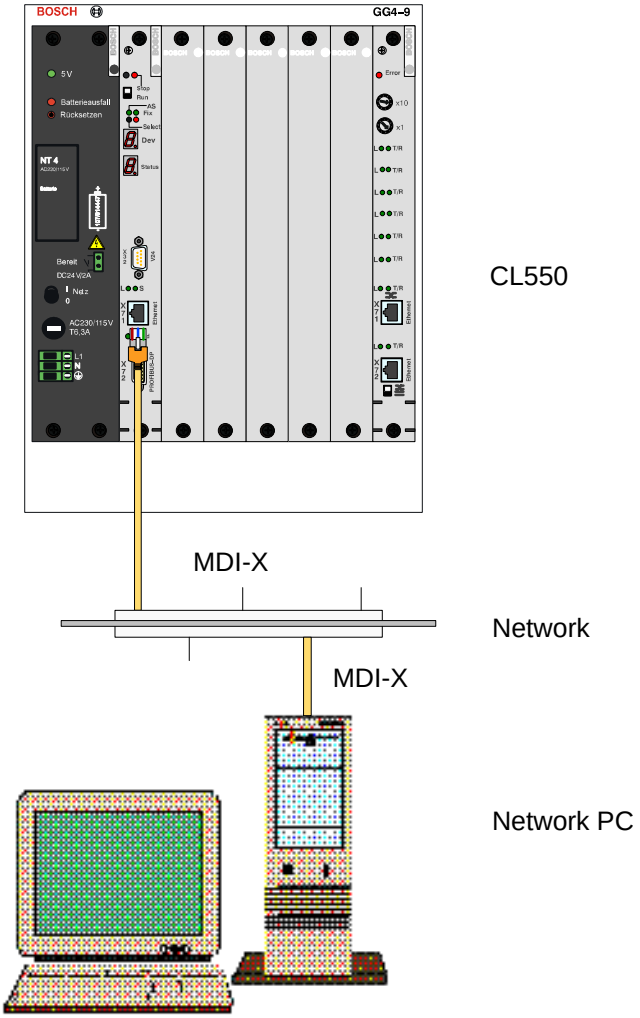


CL550

Programming device

Connection to a network PC

The ZS550 and the PC communicate via the network. A cross-over cable links the Ethernet interface X71 on the ZS550 with a network connection.



Load configuration

★ Select menu CONFIGURATION ▶ LOAD to start the loading procedure.

Further steps

☞ **For information on further steps, see page 4–22.**

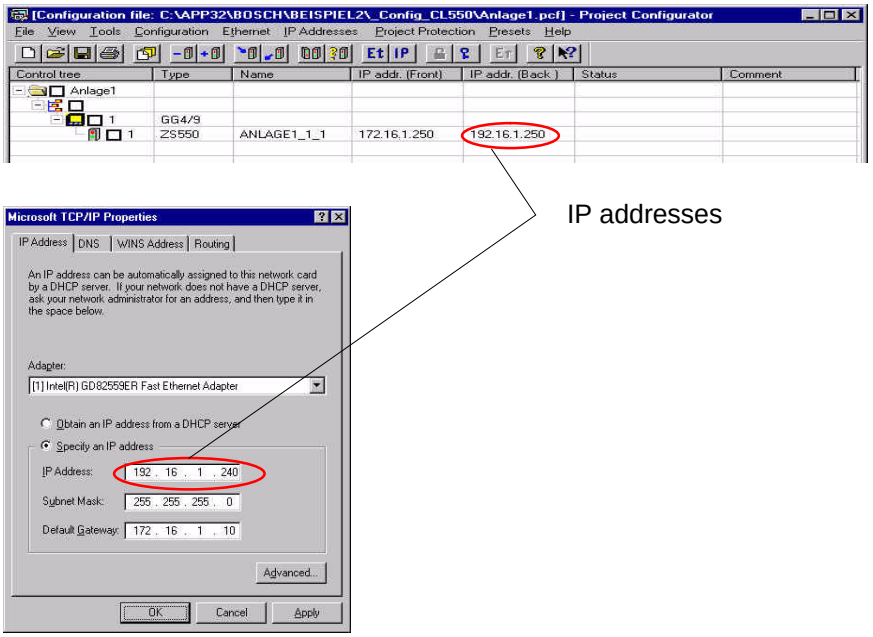
4.2.2 Connection via the CON550 Module

Presetting Rack_ID

The Rack_ID (rack address) has to be set prior to commissioning. The Rack_ID is the identification number of a rack [01 to 99]. Each Rack_ID can only be assigned once in a controller system. In the CON550 module, it is set via rotary switches on the frontside.

Setting TCP/IP addresses

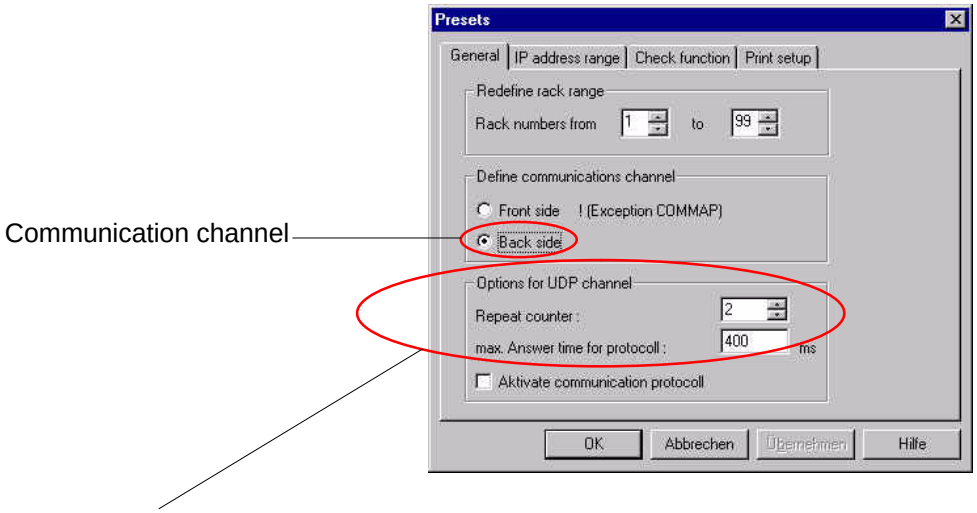
To establish a communication, the IP addresses of the programming device/ the network PC and the IP address of the ZS550 backside have to be located in the same subnetwork.



☞ **The IP addresses are determined by the network administrator.**

Presetting communication channel

★ Determine communication channel ”backside” in the project configurator under menu PRESETS.



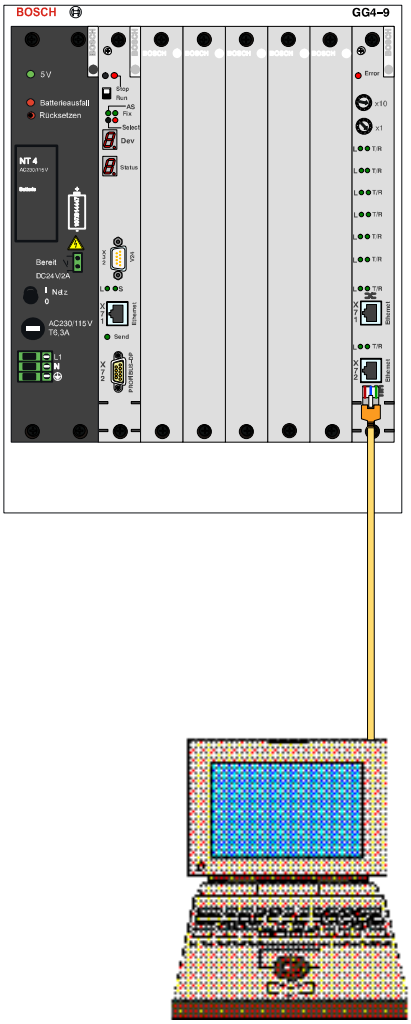
UDP channel options:

- Repeat counter indicates how many retransmissions of a telegram are admissible.
- Maximum response (answer) time per protocol indicates the time in ms which passes when there is no reaction until the telegram is retransmitted.

Connection to a programming device

The CON550 module and the programming device communicate via a patch cable. This cable connects the Ethernet interface X72 on the CON550 module with the network card in the programming device.

The selector switch on the CON550 module is in the upper ”Cross” position.



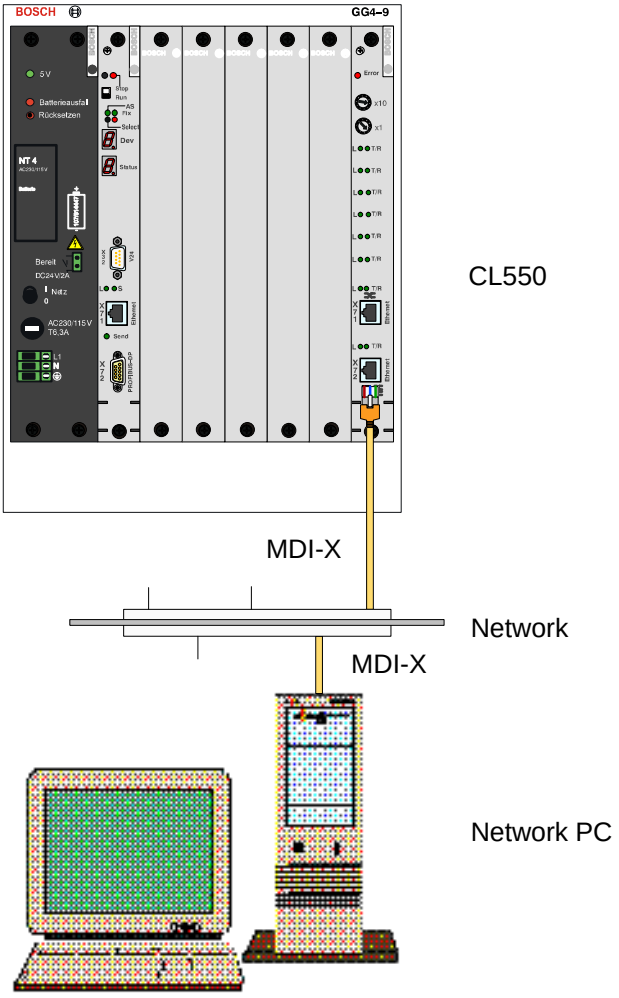
CL550

Programming device

Connection to a network PC

The CON550 module and the PC communicate via the network. A patch cable links the Ethernet interface X72 on the CON550 module with a network connection.

The selector switch on the CON550 module is in the lower ”Patch” position.



Load configuration

★ Select menu CONFIGURATION ▶ LOAD to start the loading process.

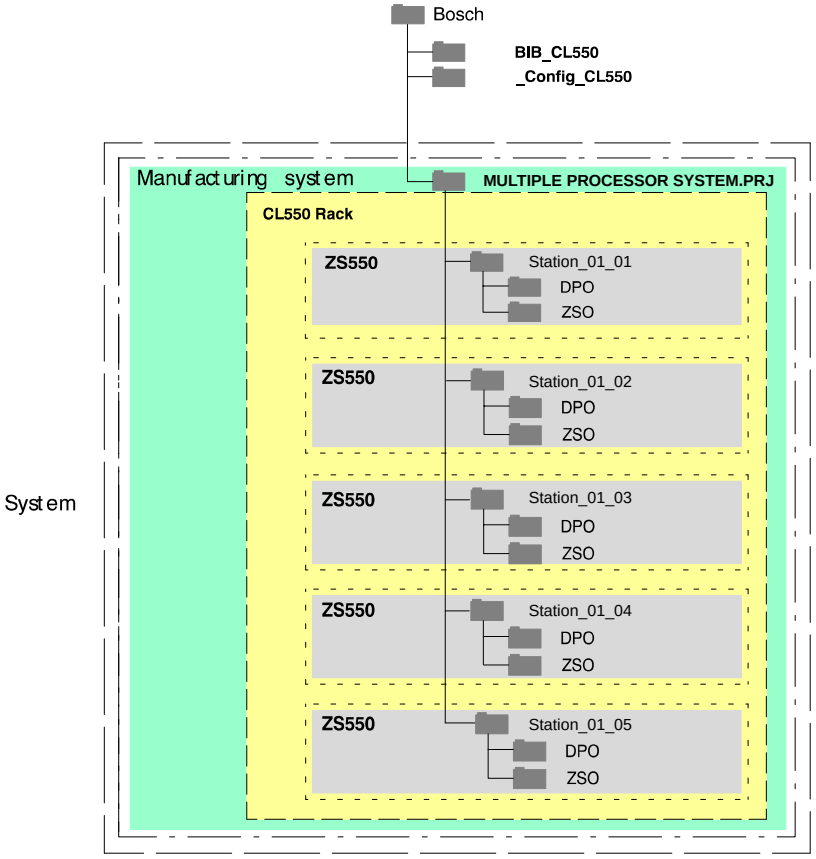
Further steps

☞ **For information on further steps, see page 4–22.**

4.3 Commissioning of a Multiple Processor System

A multiple processor system is connected via the CON550 module and/or via the respective ZS550.

Directory Structure



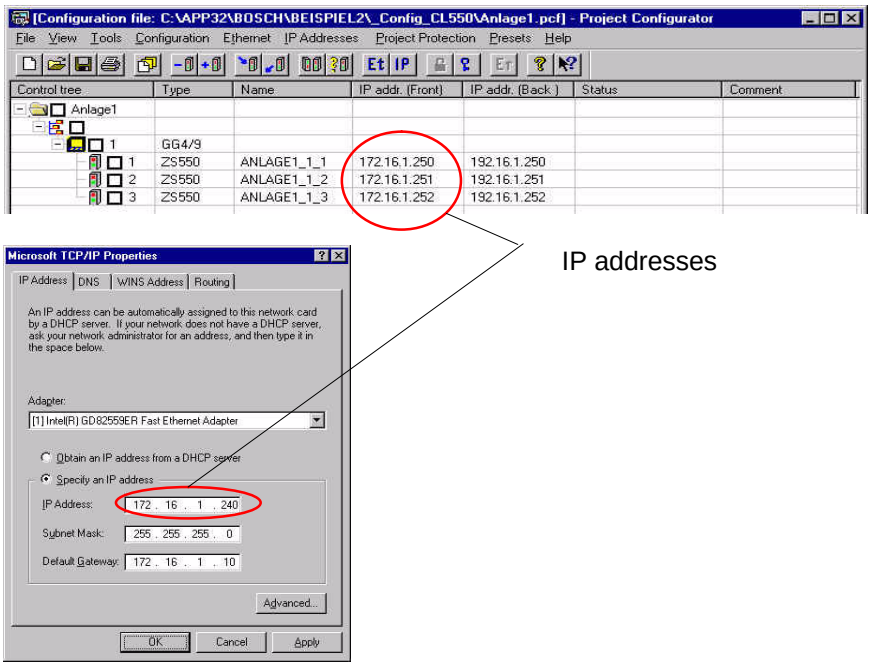
4.3.1 Connection via the Respective ZS550

Presetting Rack_ID

The Rack_ID (rack address) has to be set prior to commissioning. The Rack_ID is the identification number of a rack [01 to 99]. Each Rack_ID can only be assigned once in a controller system. In the CON550 module, it is set via rotary switches on the frontside.

Setting TCP/IP addresses

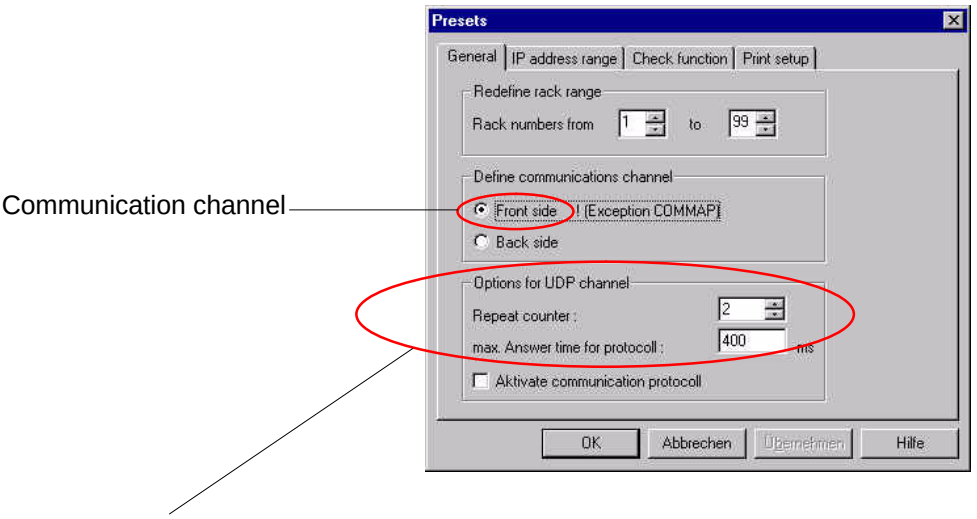
To establish a communication, the IP addresses of the programming device/ the network PC and the IP addresses of the frontside of all ZS550 have to be located in the same subnetwork.



☞ **The IP addresses are assigned by the network administrator.**

Presetting communication channel

★ Determine communication channel ”frontside” in the project configurator under menu PRESETS.

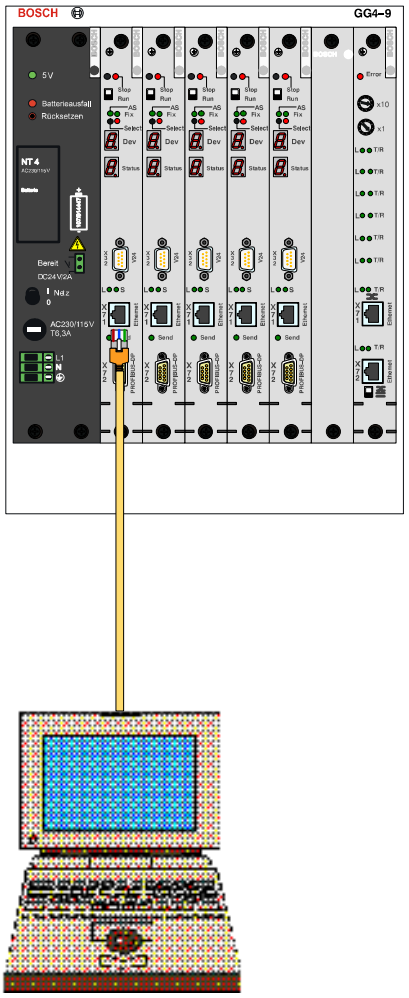


UDP channel options:

- Repeat counter indicates how many retransmissions of a telegram are admissible.
- Maximum response (answer) time per protocol indicates the time in ms which passes when there is no reaction until the telegram is retransmitted.

Connection to a programming device

The respective ZS550 and the programming device communicate via a cross-over cable. This cable connects the Ethernet interface X71 on the ZS550 with the network card in the programming device.



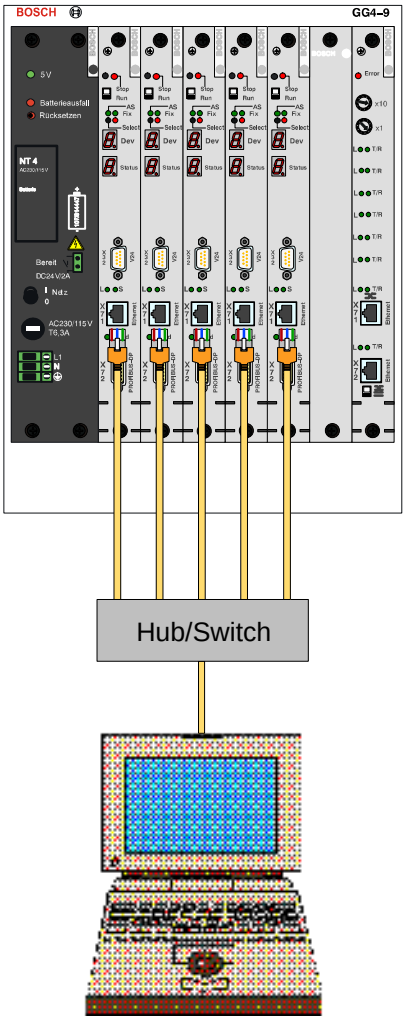
CL550

Programming device

Connection to a hub/switch and programming device

Several ZS550 and the programming device communicate via patch cables. These cables connect the Ethernet interface X71 on the ZS550 with the hub/ switch.

The hub/switch is connected to a programming device via a patch cable. This cable connects the hub/switch to the network card in the programming device.



CL550

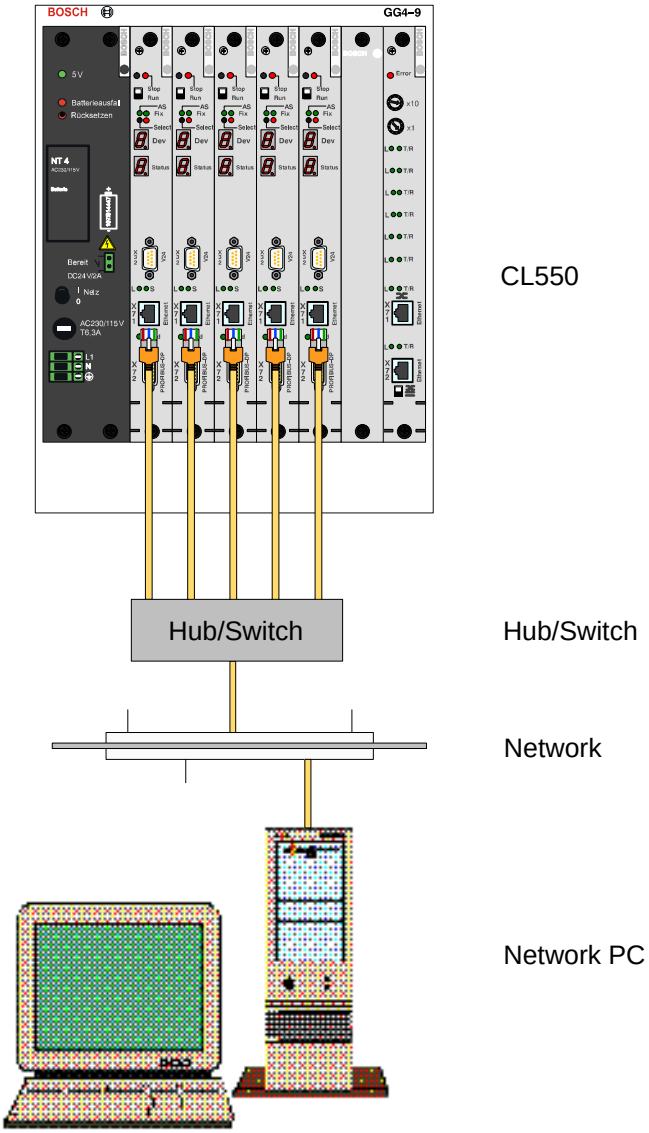
Hub/Switch

Programming device

Connection to a hub/switch and network PC

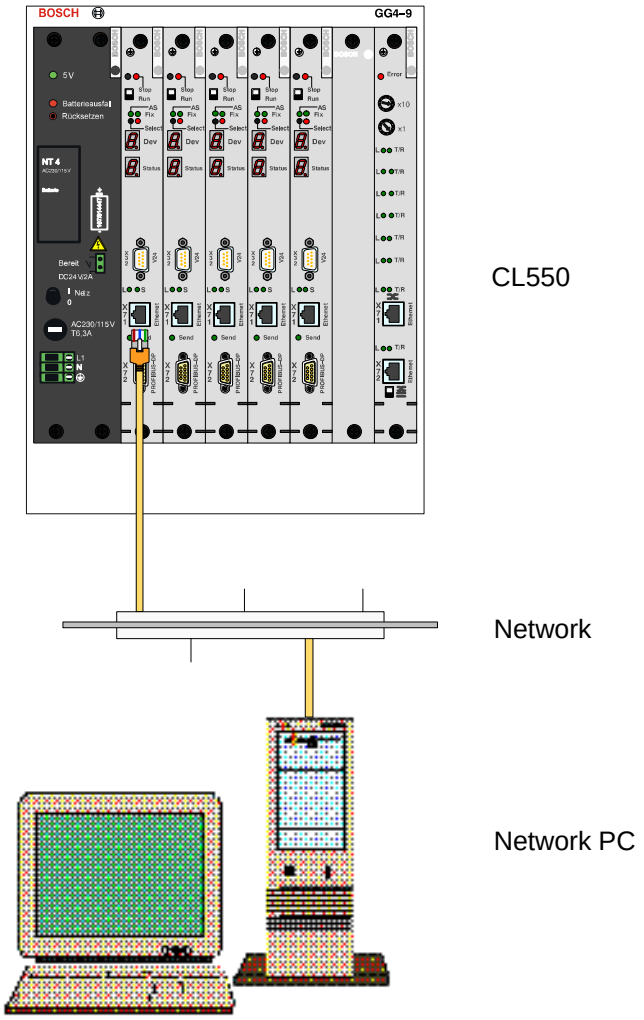
Several ZS550 and the network communicate via patch cables. These cables connect the Ethernet interface X71 on the ZS550 with the hub/switch.

The hub switch is connected via the network using a patch cable. This cable links the hub/switch with a network connection.



Connection to a network PC

The respective ZS550 and the PC communicate via the network. A patch cable links the Ethernet interface X71 on the ZS550 with a network connection.



Load configuration

★ Select menu CONFIGURATION ▶ LOAD to start the loading procedure.

Further steps

☞ **For information on further steps, see page 4–22.**

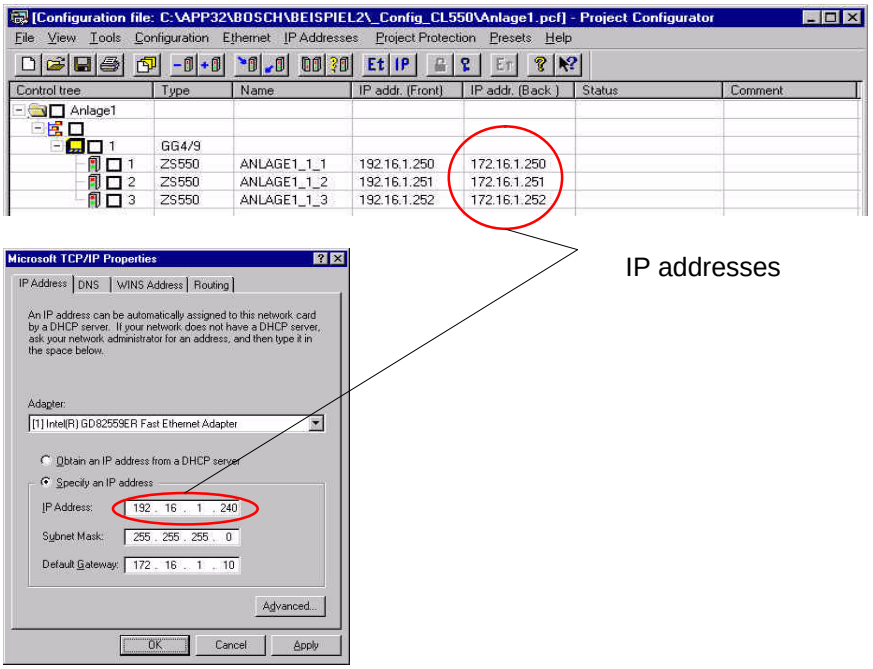
4.3.2 Connection via the CON550 Module

Presetting Rack_ID

The Rack_ID (rack address) has to be set prior to commissioning. The Rack_ID is the identification number of a rack [01 to 99]. Each Rack_ID can only be assigned once in a controller system. In the CON550 module, it is set via rotary switches on the frontside.

Setting TCP/IP addresses

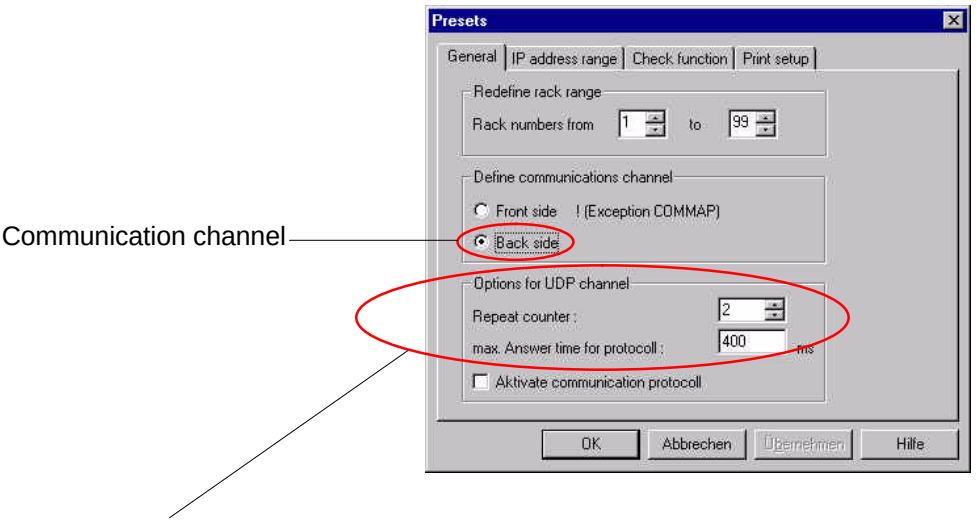
To establish communication, the IP addresses of the programming device/ the network PC and the IP addresses of the backside of all ZS550 have to be located in the same subnetwork.



☞ **The IP addresses are assigned by the network administrator.**

Presetting communication channel

★ Determine communication channel ”backside” in the project configurator under menu PRESETS.



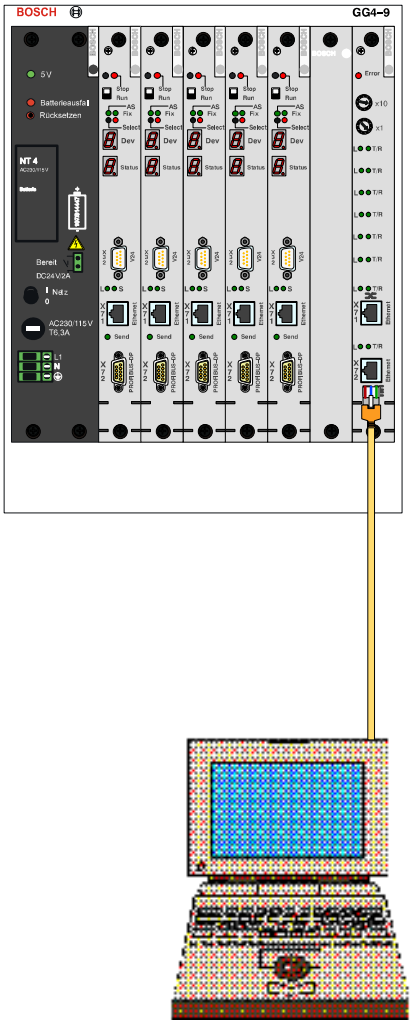
UDP channel options:

- Repeat counter indicates how many retransmissions of a telegram are admissible.
- Maximum response (answer) time per protocol indicates the time in ms which passes when there is no reaction until the telegram is retransmitted.

Connection to a programming device

The CON550 module and the programming device communicate via a cross-over cable. This cable connects the Ethernet interface X72 on the CON550 module to the network card in the programming device.

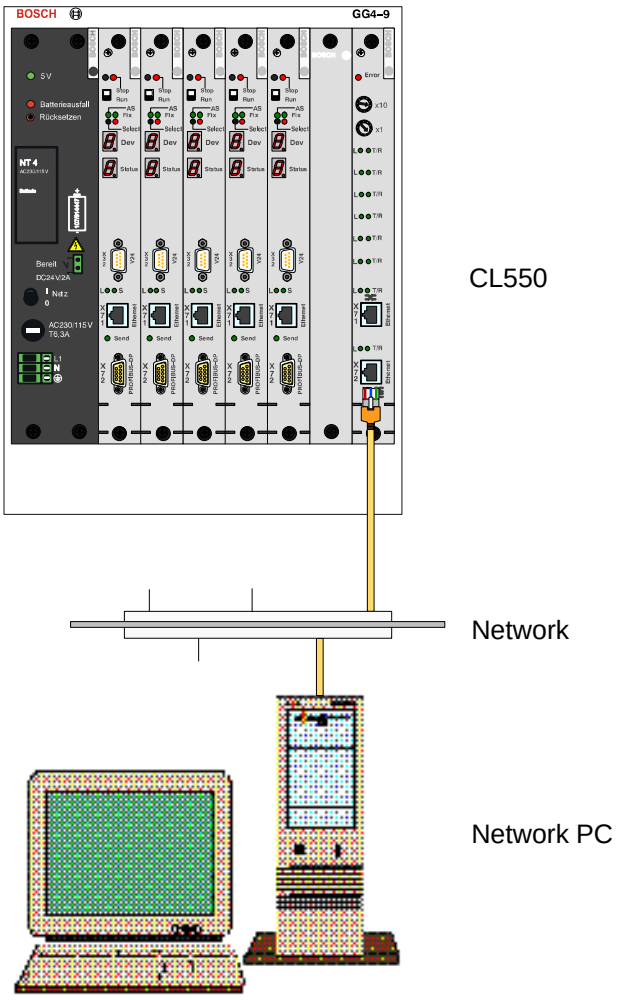
The selector switch on the CON550 module is in the upper ”Cross” position.



Connection to a network PC

The CON550 module and the PC communicate via the network. A patch cable links the Ethernet interface X72 on the CON550 module to a network connection.

The selector switch on the CON550 module is in the lower ”Patch” position.



Load configuration

★ Select menu CONFIGURATION ▶ LOAD to start the loading procedure.

Further steps

☞ **For information on further steps, see page 4–22.**

4.4 Configure WinDP

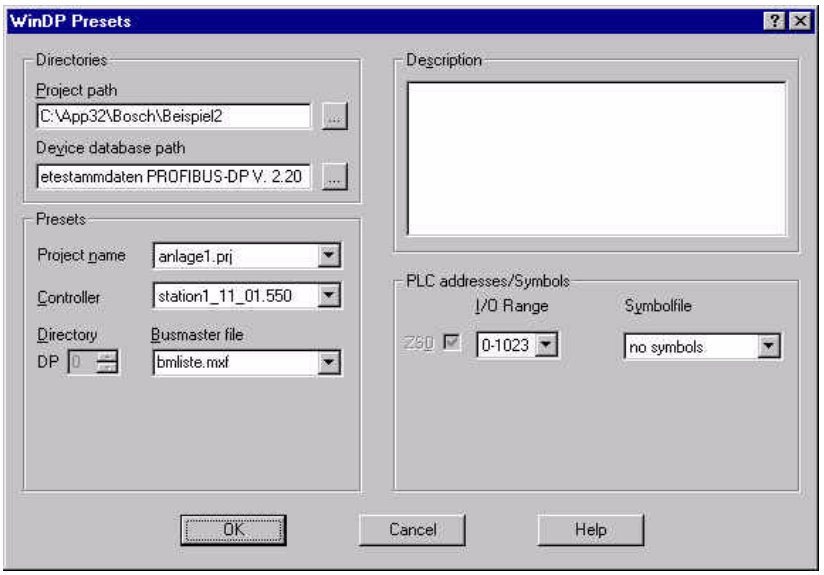
WinDP is a utility program used to configure the decentralized peripherals of the PROFIBUS-DP.

Start WinDP

★ Call WinDP in the START menu of the task bar.

Open project

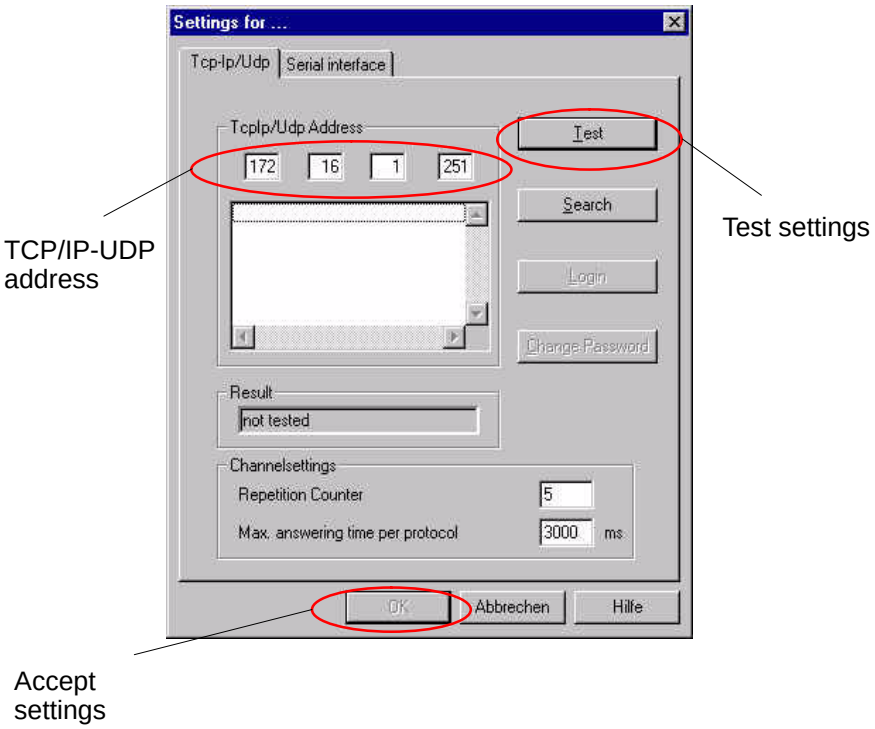
Select directories, presettings and PLC address range/symbols of the project.



Select interface

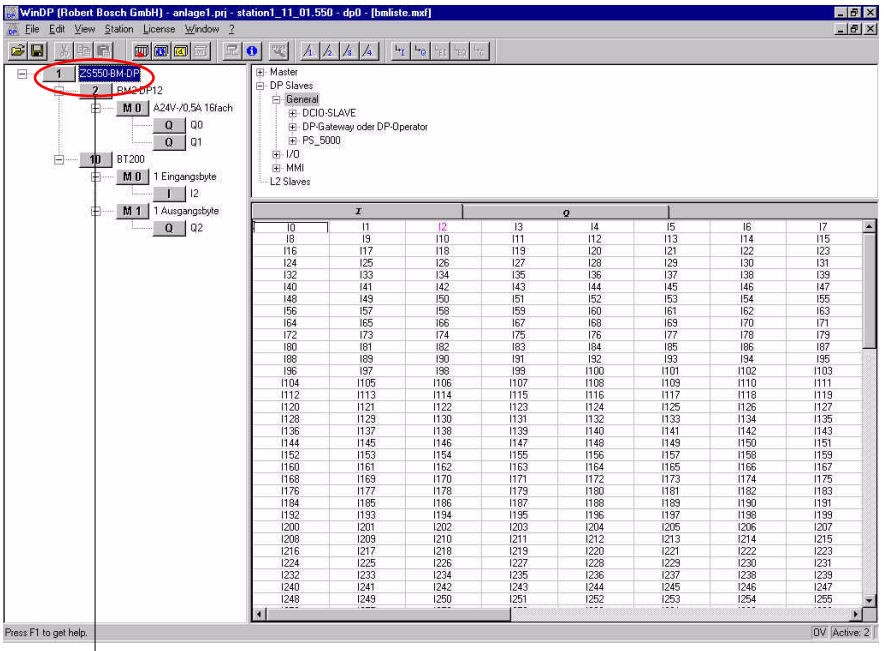
★ Select menu EDIT ▶ CONFIGURE INTERFACES.

Select TCP/IP/UDP address of the requested ZS550, test and accept settings.



Select controller

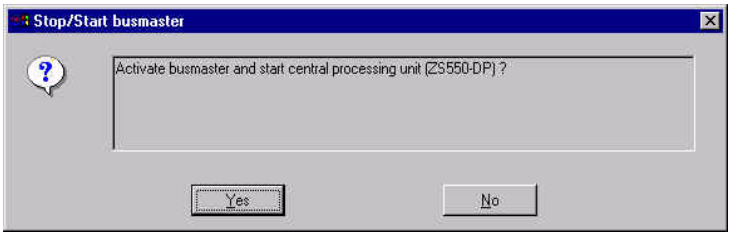
★ Select controller ZS550-BM-DP for loading of complete configuration of the PROFIBUS-DP.



Load configuration

★ Select menu FILE ▶ LOAD to load selection.

★ Start busmaster

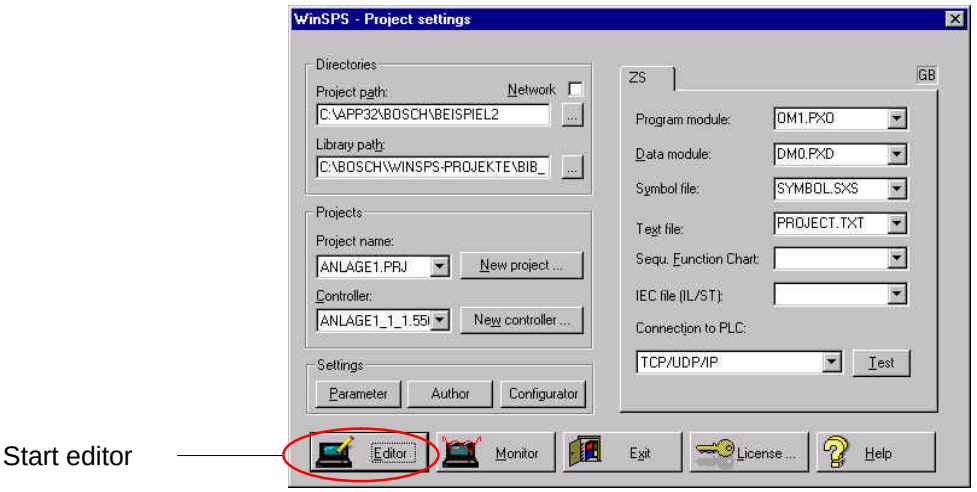


4.5 Configure WinSPS

Using the utility program WinSPS, a PLC program is created and loaded into the controller.

Start editor

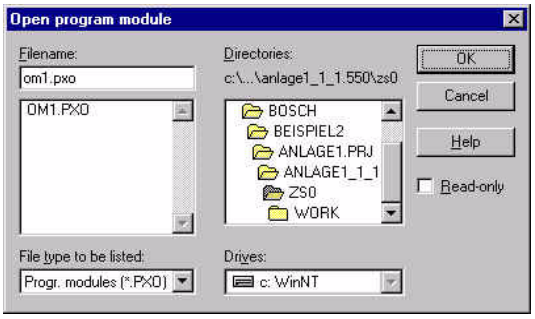
★ Call editor in the WinSPS project settings.



Open PLC program

★ Select menu FILE ▶ NEW/OPEN.

Choose file name and directory of the PLC program.

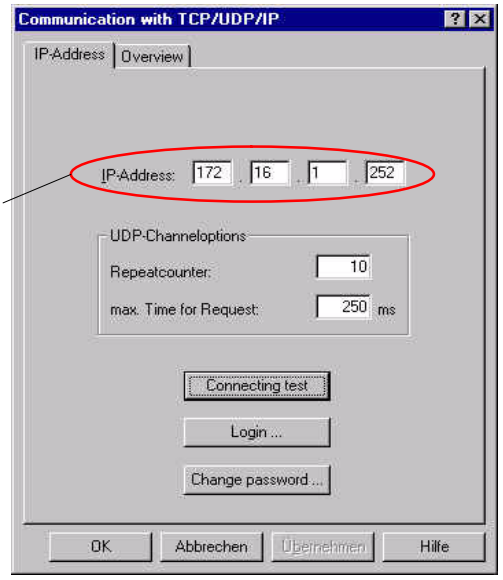


Central Programming

★ Select menu CONTROLLER ▶ CENTRAL PROGRAMMING.

Select IP address of the requested ZS550.

IP address

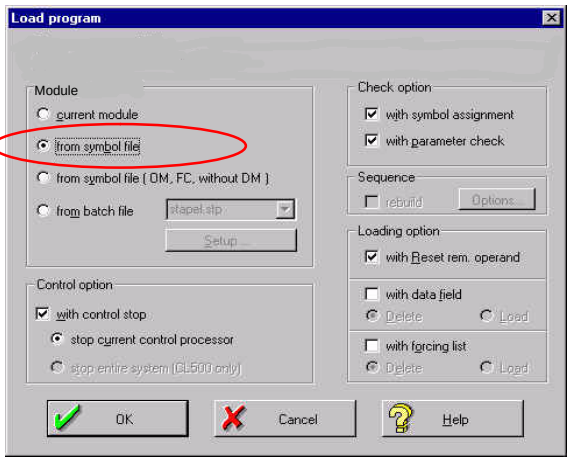


Load PLC program

★ Select menu CONTROLLER ▶ LOAD to load PLC program.

★ Load all modules of the symbol file.

Modules of the symbol file



★ Switch controller to RUN.

Final step

☞ **The commissioning process is completed with loading of the PLC program. The ZS550 have been configured, the PLC programs transmitted and the controllers are in mode of operation RUN.**

Notes:

A Appendix

A.1 Abbreviations

Abbreviation	Description
ANSI	American National Standards Institute
BCD	Binary coded decimal code
BUEP	Bosch Transmission Protocol (Bosch–Übertragungsprotokoll)
COMx	Serial Interface x
CPU	Central Processing Unit
DIP switch	Dual Inline Package Switch. Very small switch on the adapter card, which serves to configure the card.
DM	Data Module
DP	Decentralized Peripherals, stands for PROFIBUS DP bus system
EEM	Electrostatically Sensitive (Endangered) Components (Modules)
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge; abbreviation for all terms that concern electrostatic discharges, e.g. ESD protection, ESD danger
FC	Function Call
FTP	File Transfer Protocol, fast TCP/IP protocol on application level for downloading or sending text-based and binary files
HMI	Human Machine Interface; devices for operation and monitoring
HW	Hardware
I	Input
ID	Identification Number
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode, status display
MAC	Media Access Control; MAC determines, when a device is allowed to send data
MPS	Master Parameter Set
O	Output
PCL	Deriving from the terms Personal Computer and Control Logic, short form for Software PLC
PE	Protective Earth
PLC	Programmable Logic Controller
RJ-45	Subminiature Cannon connector with 8 pins, which is especially used for UTP cables for 10Base–T and 100Base–T.
SW	Software
TCP/IP	Transmission Control Protocol/Internet Protocol
UDP	User Datagram Protocol, connectionless transport protocol

A.2 Subject Index

Bosch-Automationstechnik

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Industriehydraulik
Postfach 30 02 40
D-70442 Stuttgart
Fax (07 11) 8 11-18 57

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Mobilhydraulik
Postfach 30 02 40
D-70442 Stuttgart
Fax (07 11) 8 11-17 98

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Pneumatik
Postfach 30 02 40
D-70442 Stuttgart
Fax (07 11) 8 11-2 45 30

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Montagetechnik
Postfach 30 02 07
D-70442 Stuttgart
Fax (07 11) 8 11-77 77

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Antriebs- und Steuerungstechnik
Postfach 11 62
D-64701 Erbach
Fax (0 60 62) 78-4 28

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Schraub- und Einpreßsysteme
Postfach 11 61
D-71534 Murrhardt
Fax (0 71 92) 22-1 81

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Entgrattechnik
Postfach 30 02 07
D-70442 Stuttgart
Fax (07 11) 8 11-3 34 75

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
didactic
Postfach 11 62
D-64701 Erbach
Fax (0 60 62) 78-8 33

Österreich
Robert Bosch AG
Geschäftsbereich
Automationstechnik
Hüttenbrennergasse 5
A-1030 Wien
Fax (01) 7 97 22-60 96

Schweiz
Robert Bosch AG
Geschäftsbereich
Automationstechnik
Industriestr. 31
CH-8112 Otelfingen
Fax (01) 8 47 14 99

Technische Änderungen vorbehalten

Ihr Ansprechpartner

BOSCH

Robert Bosch GmbH
Geschäftsbereich
Automationstechnik
Antriebs- und Steuerungstechnik
Postfach 11 62
D-64701 Erbach
Fax (0 60 62) 78-4 28

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