Modbus TCP Gateway

Modbus TCP Gateway (incl. power supply NT02): Order No.: NN
Accessorie power supply 230 V / 24 V DC: Order No.: KGLNT23024

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1 Technical safety information

1. Commissioning and operation of the device may only be performed by qualified personnel. "Qualified personnel" as defined by this technical safety information means persons who have the authorisation to start up, earth and designate devices, systems and electric circuits in accordance with security technology standards.

2. Mounting, positioning and wiring may only be conducted when the electricity supply to the assembly has been cut off.

3. The faultless and safe operation of the product presupposes proper transport, appropriate storage, positioning and assembly, as well as careful operation and maintenance.

4. Voltage must only be supplied by VDE-tested and CE-certified power packs.

5. Ensure that the voltage supply and the data cable are correctly connected.

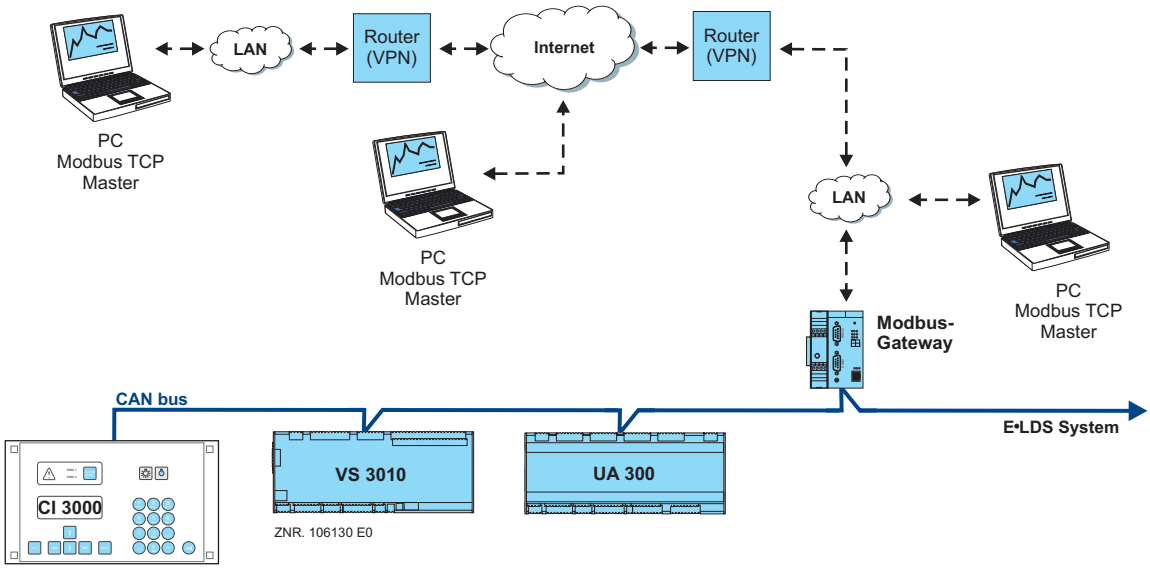
6. If the product is brought into the working area from a cold environment, condensation may form. The product must be completely dry before being commissioned. Do not assemble or install the product near water or in damp surroundings.

7. Do not take the product apart or remove the enclosure. The guarantee rights will become invalid if the housing is opened.

2 Tasks of the Modbus TCP Gateway

Field of application:

The Modbus TCP Gateway is used to connect an E•LDS system to a network (LAN) for the purpose of local operation on site (e.g. for the market manager), as well as for remote supervision and configuration. This TCP/IP-based form of communication represents an alternative to transmission via serial interface, modem or CAN bus-PC adapter, and it so helps the development towards a network-based communication solution:



It is possible to access the E•LDS system via a PC in the same network (local LAN) by means of the LDSWin software. In addition, a connection can also be made via the Modbus TCP Gateway to an E•LDS system outside the network boundaries. To do this, existing Internet connections can be used to access an E•LDS system from a PC at another location.

*No more than one Modbus TCP Gateway **or** one PC-CAN bus adapter **or** one LAN Gateway can be used in an E•LDS system.*

Connection:
Simultaneous access to up to four clients is possible

Interfaces:
1x serial as per RS232 standard
1x CAN bus interface (RS-232)
1x Ethernet interface (RJ-45 / 10BASE-T)

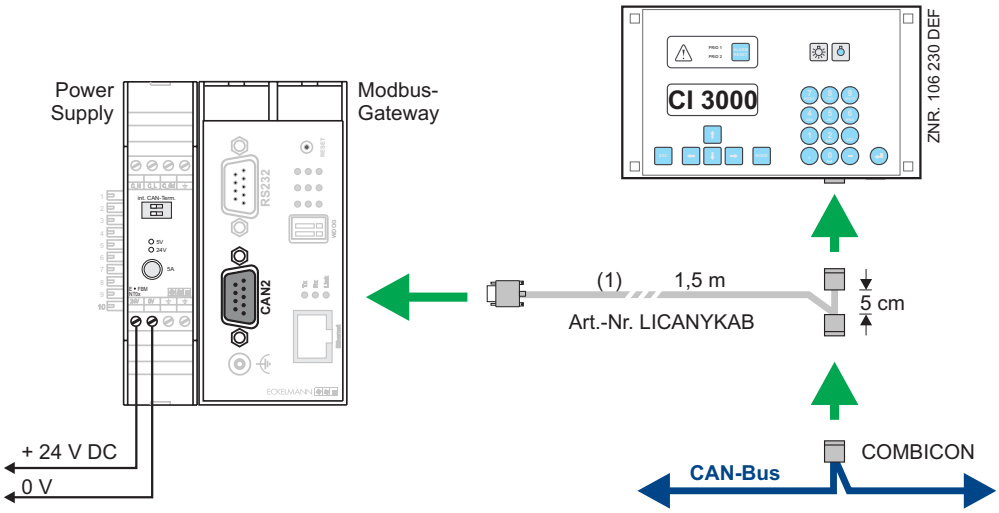
Voltage supply:
The Modbus TCP Gateway is supplied with voltage via the type NT02 power pack (provided). The power pack is coupled laterally (usually on the left) to the Modbus TCP Gateway and it must be supplied with 24 V DC of a separate power supply (order no. KGLNT23024).

3 Assembly and start-up of the Modbus TCP Gateway

To communicate within a network, the Modbus TCP Gateway needs an individual IP address, including the corresponding subnet mask. These details must be obtained from the administrator of the network **before commissioning** and configuring the Modbus TCP Gateway as described in section 3.3.1. The Modbus TCP Gateway may only be integrated in the network once this has been done.

3.1 Assembly and CAN bus connection

Before the Modbus TCP Gateway is started for the first time, it must be connected to the CAN bus via the Sub-D plug (CAN2) on the front. To this end, a CAN bus connection must be interrupted (generally at the CI 3000 Store Computer) and the CAN bus-Y cable supplied (1) must be inserted in between. Subsequently, the device must be supplied with 24 V DC (power supply order no. KGLNT23024):



Specific details of connection to the CAN bus (specifying the type of conductor, permissible conductor length, necessary terminating resistors, and correct routing, etc.) are described in detail in the Introduction manual.

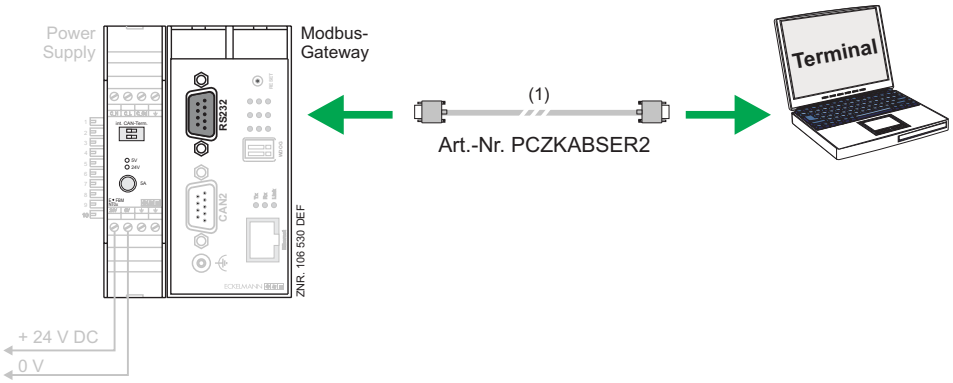
Unprofessional shielding of the CAN bus leads to electromagnetic noise fields. During wiring work, it is essential that the conductors be connected by a professional and correctly shielded.

3.2 Serial connection to the service PC

The Modbus TCP Gateway has an extended monitor interface with Z-modem file transfer. This is at the socket designated "RS232" on the front of the enclosure.

Via this interface with a Z-modem-capable terminal program

- the commands of the monitor program can be used.
- software (e.g. Windows HyperTerminal) can be updated.



A null modem cable (1) is needed for a serial connection between the PC and the Modbus TCP Gateway.

3.2.1 Calling up and configurating the "HyperTerminal" terminal program

In the standard Windows installation (for example, Windows 2000/XP), at

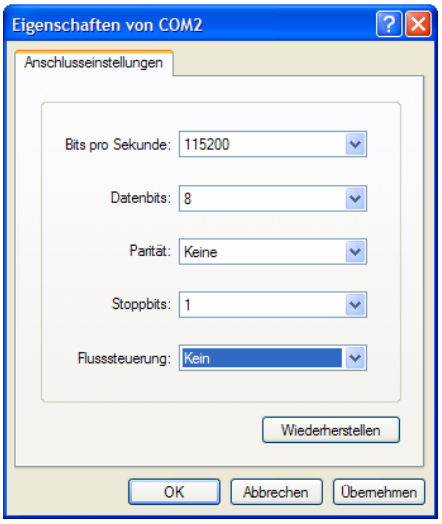
Start -> programs -> accessories -> communications -> HyperTerminal

a terminal program permits communication between the PC and the Modbus TCP Gateway via the serial interface (by means of null modem cable).

After launching the program, a name must first be entered (e.g. Modbus TCP Gateway) together with a symbol for the desired connection.

The port must be selected where the null modem cable is attached (e.g. COM2).

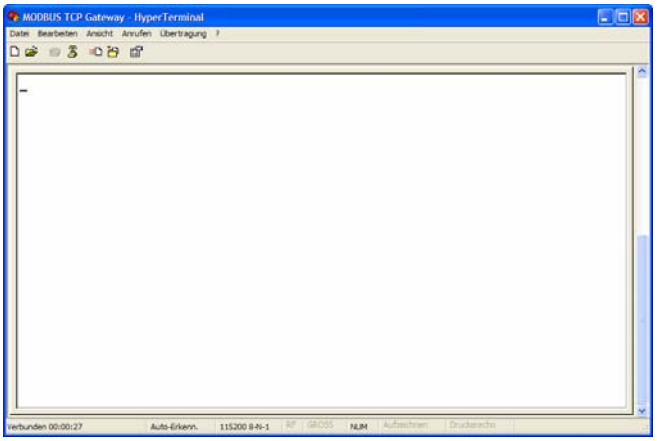
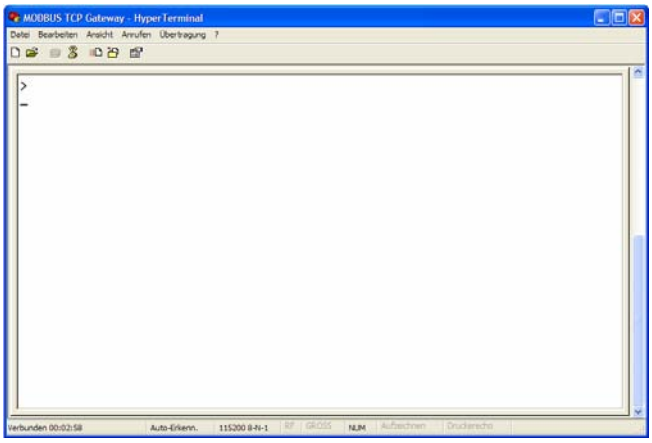
The program first requests the various telephone connection settings (country, region and area code). These details have no significance for the connection with the Modbus TCP Gateway and they can therefore be selected quite freely.

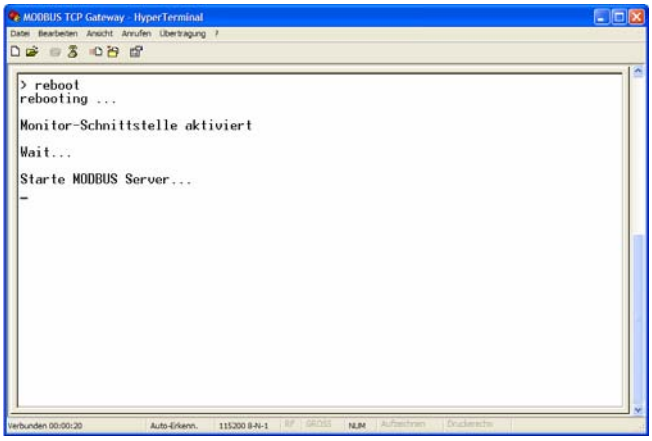


In the mask that will now open, the following settings can be made for the serial interface.

3.2.2 Calling up the Modbus TCP Gateway's monitor interface

While running, the Gateway (operational LED lit up) the monitor interface is activated by entering a question mark "**?**", recognisable at the input prompt "**>**".

Step	PC procedure
1.	Start the PC; attach the serial null modem cable to the Modbus TCP Gateway.
2.	Call up the PC's terminal program (e.g. with Windows 2000/XP, you can find it at ***programs - > accessories - > communications - > HyperTerminal***)
3.	Ensure the terminal program is provided with the correct connection parameters (see section 3.2.1). 
4.	Keep pressing "**?**" until the prompt symbol "**>**" appears:  ***ATTENTION:*** *- once this succeeds, continue to point 6 .* - If the "**>**" symbol does not appear at the prompt, continue as described at point 5.

5.	Restart the Modbus TCP Gateway by entering "**reboot** ↵" or by pressing the RESET key on the enclosure. After the restart, press "**?**" until the prompt symbol "**>**" appears.
	
6.	It is possible to enter monitor program commands (e.g. "**ver** ↵") (see also section 3.4.4)

3.3 Connection via the Ethernet

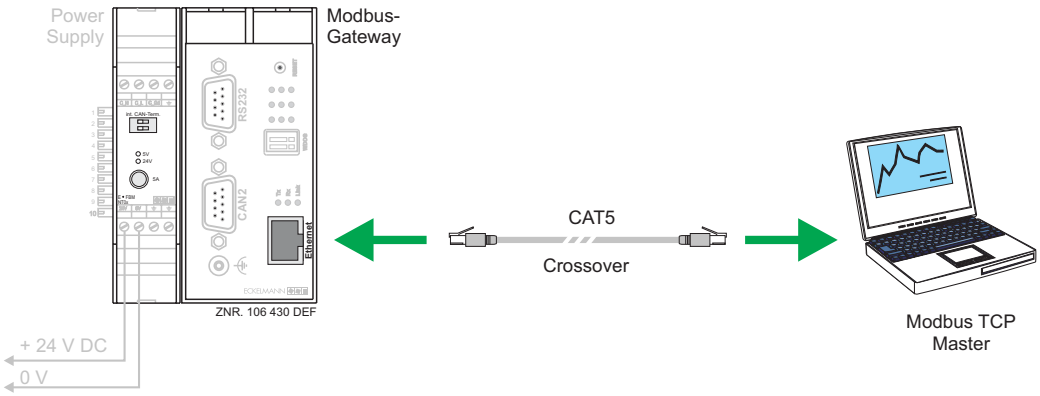
For communication within a network, the Modbus TCP Gateway needs an individual IP address, including the corresponding subnet mask. These details must be obtained from the administrator of the network **before commissioning** and configuring the Modbus TCP Gateway as described in section 3.3.1. The Modbus TCP Gateway may only be integrated in the network after this has been done.

Communication takes place via TCP/IP port 5000. If connection is made via a firewall, port 5000 must be cleared for TCP/IP service.

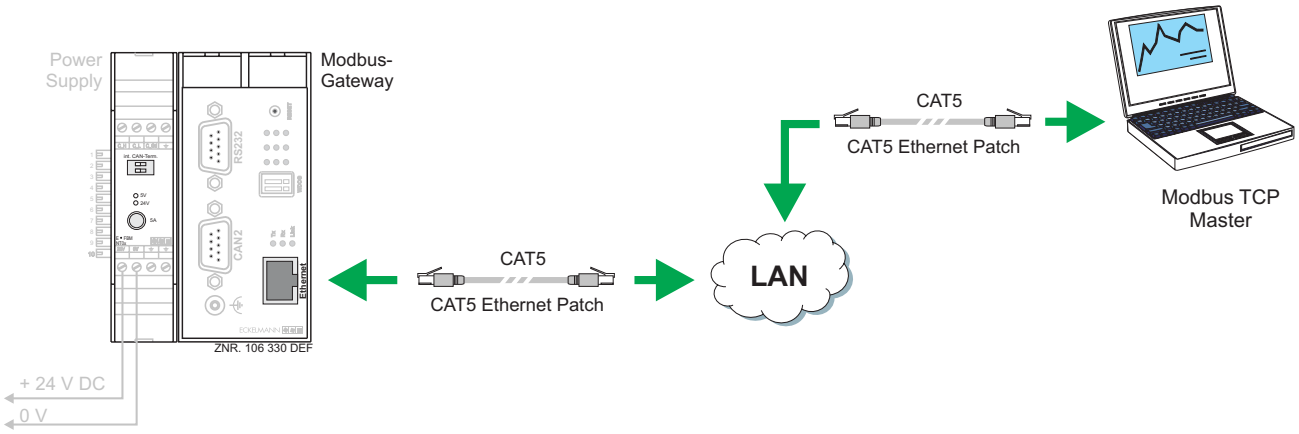
*A double or incorrect assignment of IP addresses and/or subnet masks can lead to the failure of components within a network. Consequently, in every case, the Modbus TCP Gateway must be provided with an appropriate IP address **before connection** to the network.*

For a direct network connection between the Modbus TCP Gateway and a user PC, the IP address and subnet mask can be freely selected from the private IP address area. Section 3.3.2 describes the configuration of the PC for a direct connection of this type in detail.

For a **local** connection between the Modbus TCP Gateway and a PC, an Ethernet CAT5 crossover-patch cable is needed:



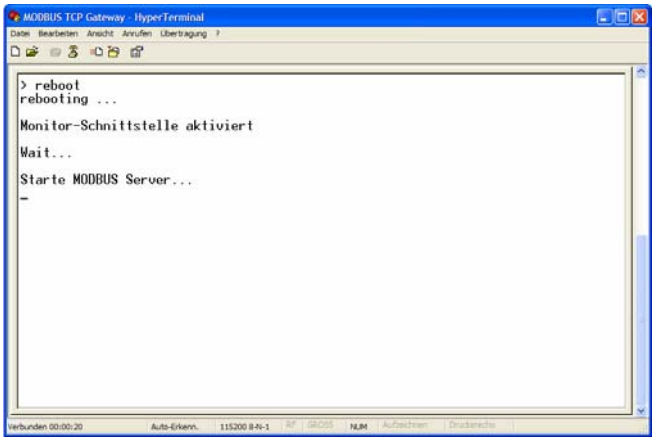
A CAT5 Ethernet patch cable is required for a **remote** connection between the Modbus TCP Gateway and a PC via a network.

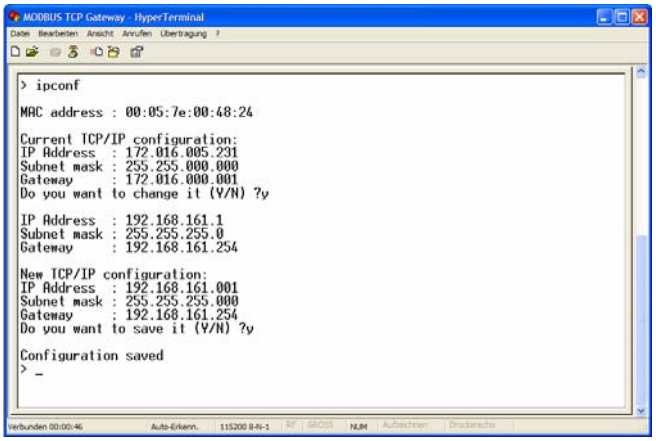


3.3.1 Setting the IP address via the monitor interface (serial interface)

When delivered, the Modbus TCP Gateway has a specific, but randomly chosen IP address and subnet mask.

The correct IP address, subnet mask and possible also the Gateway address for the network is set via the Modbus TCP Gateway's monitor interface (serial interface).

PC procedure	Modbus TCP Gateway procedure
	Monitor interface is activated (see the "Calling up the monitor interface" section)
The IP address can be set via the activated monitor interface by the "**ipconf**" command.	

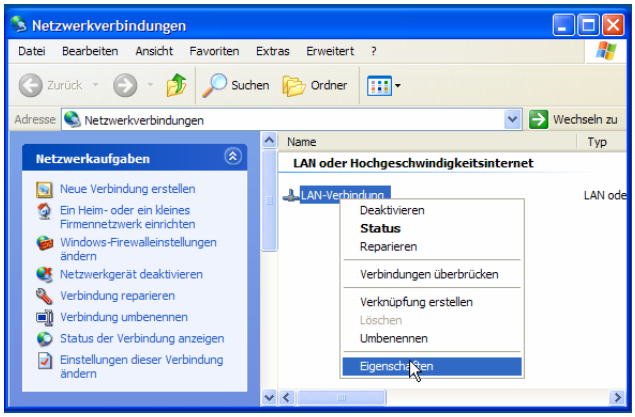
After entering the "**ipconf** ↵" command, the current address setting of the Modbus TCP Gateway will appear:	
	The IP address of the controls must be checked, here: *172.16.5.108*, for example The subnet mask is *255.255.0.0*. The IP address of the Modbus TCP Gateway and the PC must belong to the same subnet. The Gateway address is not relevant in the event that there is no Gateway present in the subnet. It may then be a free subnet IP address (though **not** "**0.0.0.0**").
After entering "**y** ↵" and the desired IP address, subnet mask and possibly the Gateway address, the IP address will be changed accordingly.	
After changing the IP address, the monitor must be exited by pressing "↵". The monitor has been left once the flashing cursor is not located on the same line as the "**>** " prompt. (the monitor "**>**" can be started at any time by pressing "**?**" again)	
Now quit the program and terminate the connection. The session can be stored together with its connection parameters.	

3.3.2 PC direct connection via a network

A CAT5 crossover-patch cable is needed in order to make a direct connection between the Modbus TCP Gateway and a PC network interface.

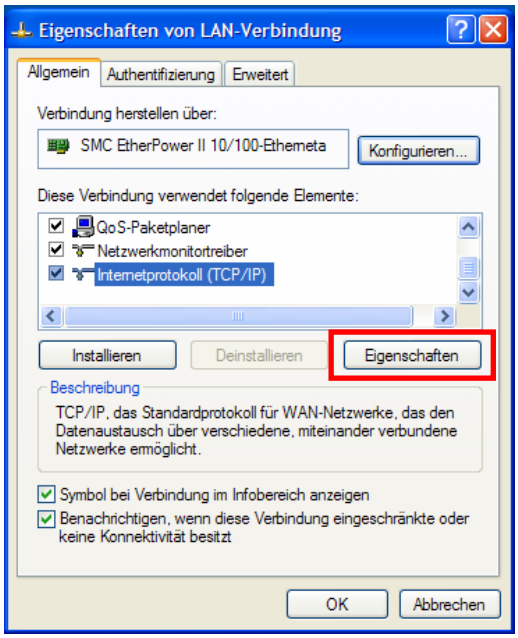
The PC and the Modbus TCP Gateway must be configured with an IP address from the private IP address range. The configuration described below is recommended:

Configuration of the PC

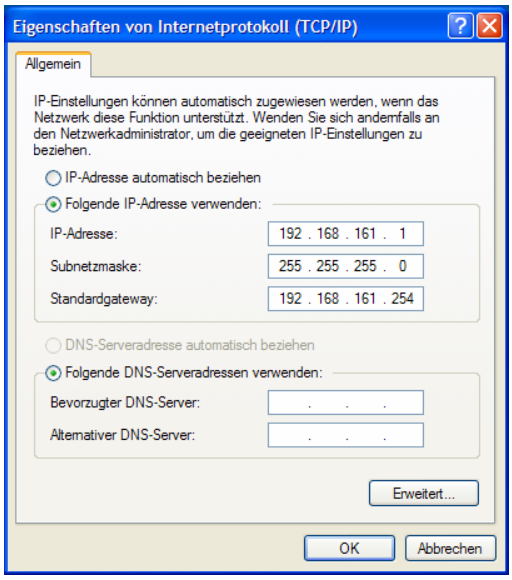


First, open the properties of the LAN connection concerned. In addition, click (with the right mouse button) on the desktop's network environment icon and select ***properties***. The adjacent window will appear:.

Select the ***properties*** option for a LAN connection to the Modbus TCP Gateway.



Make the settings for the TCP/IP protocol and have its properties displayed.



Make the following settings for the connection to the Modbus TCP Gateway:

- Use the following IP address:

IP address: *192.168.161.**1***

Subnet mask: *255.255.255.0*

Standard gateway: *192.168.161.254*

The DNS server need not be set.

Press **OK** to confirm.

Any IP address from the private IP address range can be used (e.g. *192.168.0.1 … 192.168.255.254*). However, identical network areas and subnet masks may only be used for the Modbus TCP Gateway and the PC.

Configuration of the Modbus TCP Gateway

As described in section 3.3.1, the following Modbus TCP Gateway parameters must be configured:

IP address: *192.168.161.**2***

Subnet mask: *255.255.255.0*

Gateway: *192.168.161.254*

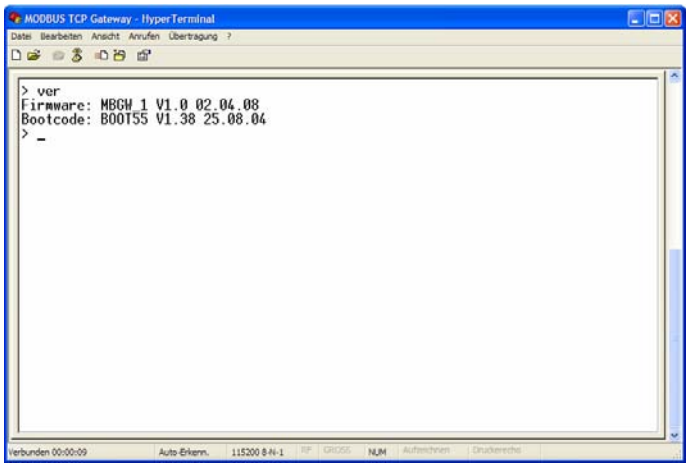
3.4 Updating the firmware via the monitor interface

Checks of, or updates to, firmware can only be made via the serial interface (RS232). In addition, a terminal program is launched on the PC (e.g. HyperTerminal, see section 3.2.1) and the monitor interface on the Modbus TCP Gateway is activated (see section 3.2.2).

The version of the Modbus TCP Gateway's firmware can be selected via the terminal program with the aid of the monitor interface (see section **Fehler! Verweisquelle konnte nicht gefunden werden.**) or it can be updated.

3.4.1 Firmware version query

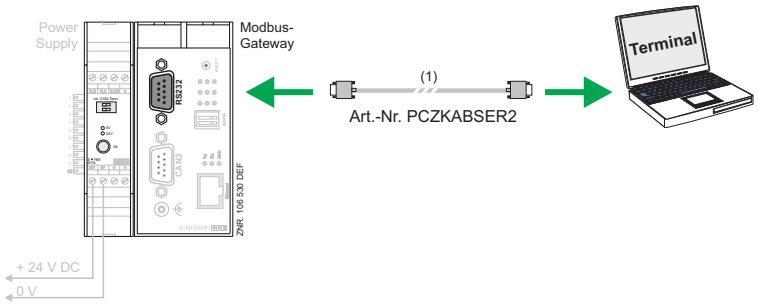
- At the prompt "**>**" of the monitor interface, details of the software version can be obtained with the "**ver**" command.



3.4.2 Activation of the update mode over the monitor interface

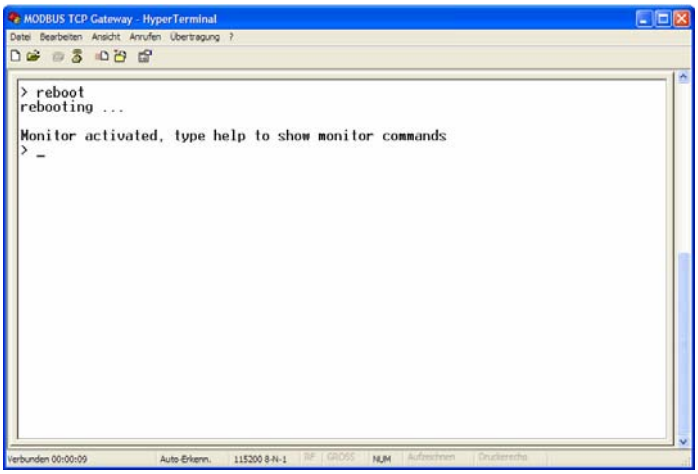
Initial state

- The Modbus TCP Gateway has been started and it is connected to the PC, via the serial interface, by a null modem cable.
- The Modbus TCP Gateway's green operational LED lights up.



Procedure

- Launch the "HyperTerminal" terminal program under Windows and activate the monitor interface.
- Enter the "**reboot**" command at the monitor interface.
- Throughout the ongoing rebooting process, keep the "**Shift** " + "**!**" keys pressed. The adjacent mask will appear.
- When the prompt symbol "**>**" appears in HyperTerminal, input in the Modbus TCP Gateway's monitor interface is active.
- LEDs 1...6 are run through in pairs, in 0.5-second pulses.

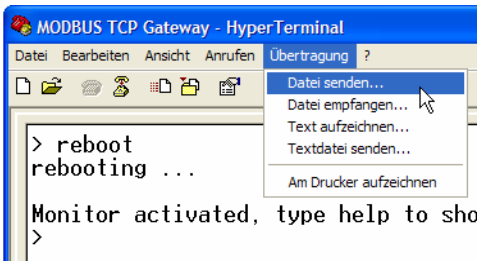


The controls can be reset with running firmware by entering '**reboot** ↵' at the monitor interface, or by switching the controls on or off, or by pressing the reset button.

3.4.3 Updating the firmware

The firmware can be loaded into the Modbus TCP Gateway via HyperTerminal by actively entering it at the monitor interface.

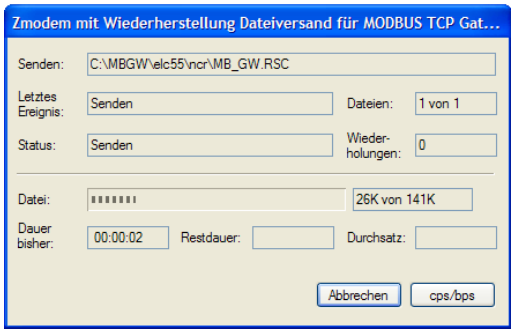
- The location of the desired Firmware file is stated using the ***transmission -> send file*** command. The following file names are reserved for the Modbus TCP Gateway firmware: **LANGWxxx.rsc**



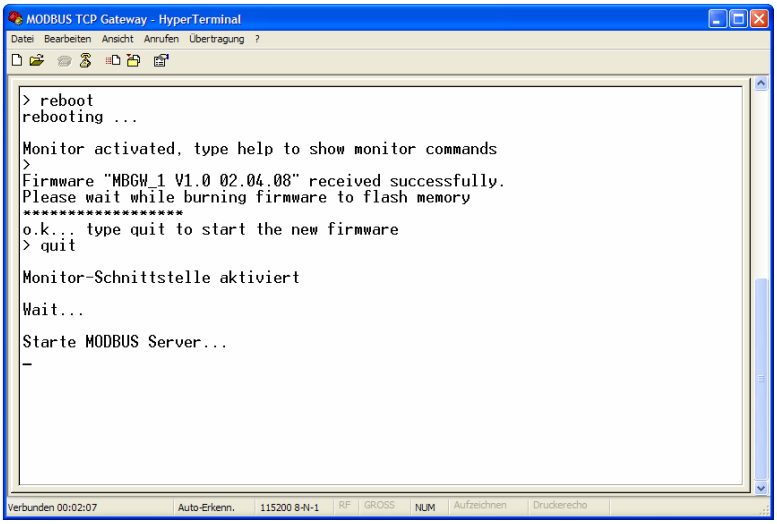
The "**xxx**" is replaced by the identification for the corresponding firmware version.

- The protocol required is "Zmodem". Start the file dispatch using the "transmit" button.

- During the transfer of the firmware to the Modbus TCP Gateway, the following dialog will appear:



- Once the loading process has been successfully completed, the following mask will appear:



- After entering "**quit**", the Modbus TCP Gateway will be started with the new firmware. The procedure takes several seconds. The LEDs of the display will light up one after the other.
- The green operational LED will light up after the new firmware has been launched (see Section 4).

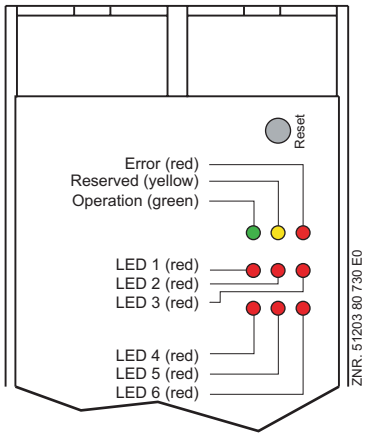
3.4.4 Important commands of the monitor interface

Command	Meaning
ver	Shows the bootloader versions and the firmware currently loaded.
sz [file name]	Transmits the firmware currently loaded under the name specified to the PC by Z-modem.
rz	This command is sent implicitly to the Modbus TCP Gateway by the connected terminal program when "Transmit files" is selected. It serves to transmit firmware or bootloaders to the Modbus TCP Gateway. In order to transmit, the ZMODEM protocol must first be selected.
quit	Terminates the boot monitor and starts the loaded firmware.
reset	Resets the Modbus TCP Gateway.
Help	Displays the boot monitor commands.

Complete the input of a command by pressing return "↵"' each time.

4 Status display of the operating states

To display the operating states, the Modbus TCP Gateway has three rows of three LEDs. These have the following significance:



When the Modbus TCP Gateway is in operation, the following blinking and display patterns apply:

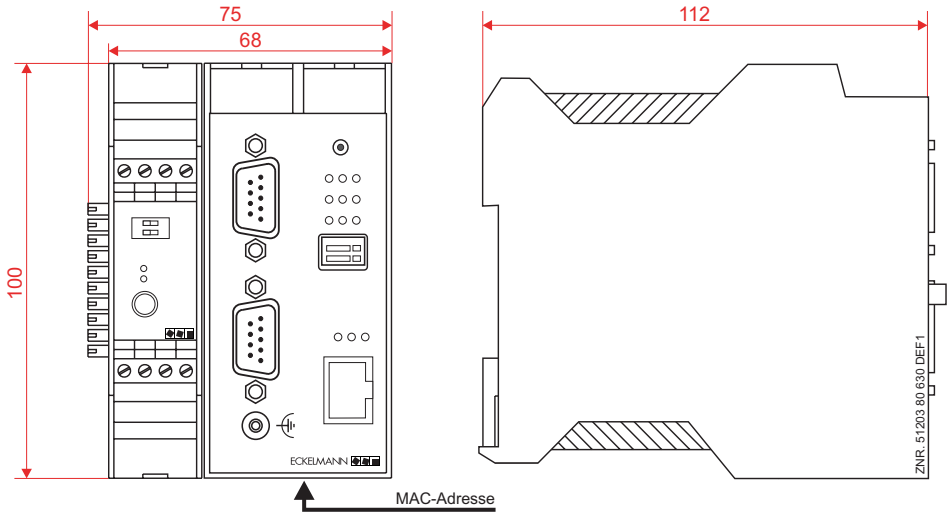
No.	Meaning	Frequency
Error	-	-
Reserved	-	-
Operation	This is lit up permanently when the Modbus TCP Gateway is up and running	Permanent
LED 1	Operating system indicator	20 Hz
LED 2	Network task indicator	1 Hz
LED 3	Reserved	-
LED 4	Permanently lit up with active LAN connection	Permanent
LED 5	Reserved	-
LED 6	Permanently lit in active terminal operation (LDSWin)	Permanent

5 Modbus TCP Gateway - technical details

5.1 Electrical details

Technical details	Modbus TCP Gateway
Order numbers	Modbus TCP Gateway (incl. power supply NT02): NN Accessorie power supply 230 V / 24 V DC: KGLNT23024
MAC address	See name plate
Interface	1x CAN bus (Sub-D) 1x serial RS232 (Sub-D) 1x Ethernet 10BASE-T (RJ-45)
Transmission rate	10 MBit/s
Temperature range - in operation	0 °C ... +50 °C 8 % … 80 % relative humidity (without condensation)
Temperature range - storage	-20 ° ... +70 °C
Status display	9 x LEDs
Voltage supply	18 … 30 V DC (typically 24 V DC / max. 200 mA)
Enclosure	Plastic, IP20, for top hat rail assembly
Weight (power supply + Modbus TCP Gateway)	Aapprox. 410 g (150 g + 260 g)
CE conformity	EEC Conformity Declaration as per - 89/336/EEC (EMC Directive) - 73/23/EEC Low Voltage Directive

5.2 Mechanical details



Technical modifications and errors reserved!