LIN103

8 SCHUKO SOCKETS TO LAN INTERFACE

USER MANUAL

12/10/2005 - Ed. 3 English

ELPRO Video Labs s.r.l.
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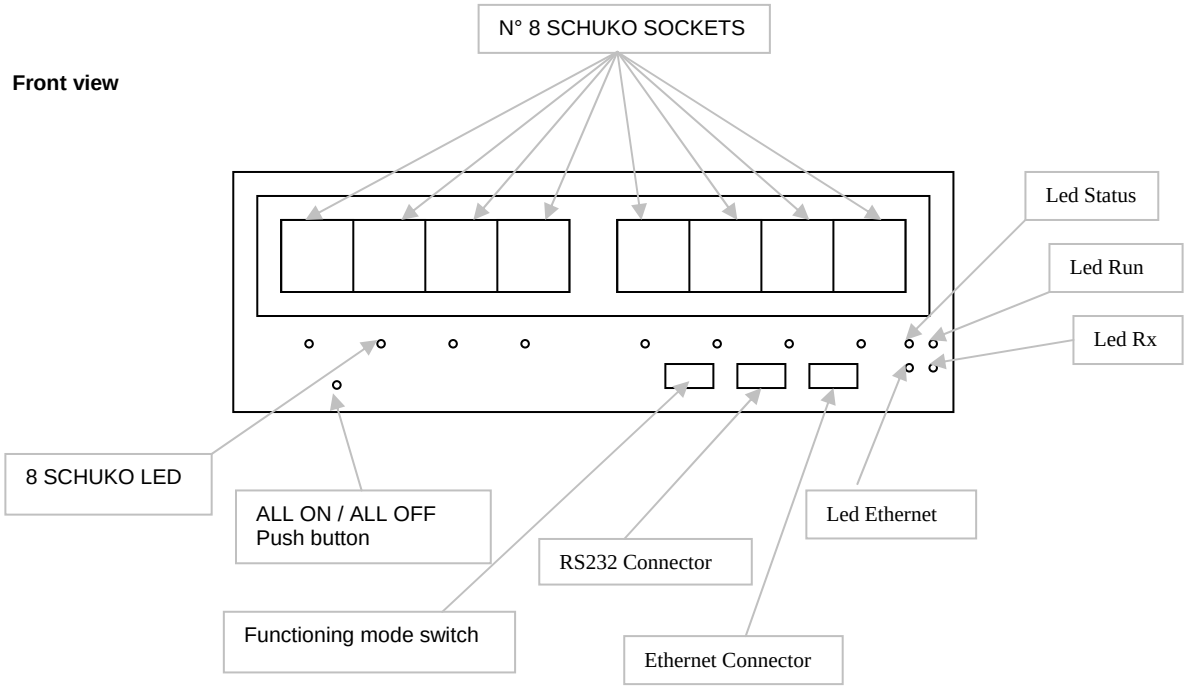
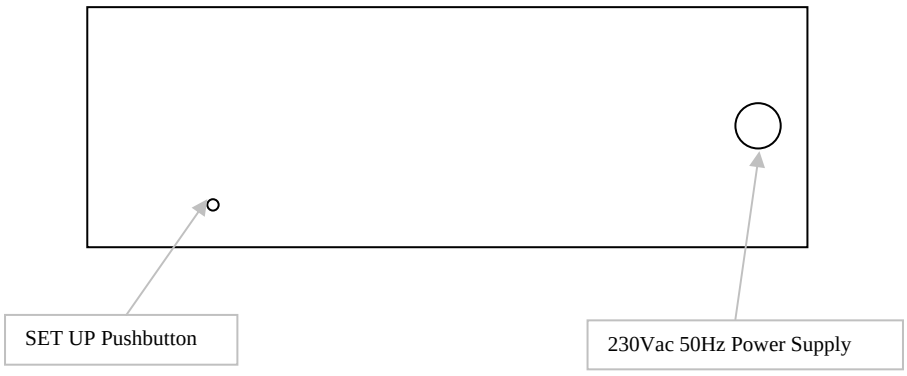
1. LIN103

The LIN103 unit makes it possible to control 8 SCHUKO sockets via a LAN or RS232 serial line; it can also perform the accessory function of RS232 / Ethernet 10baseT bi-directional converter in order to interface ELPRO units on a LAN. The LIN103 can be used on a LAN both directly and using a Virtual Serial Port. The Virtual Serial Port is created by the VSP Manager software that's provided with the installations tool.

Front view



Rear view



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1.1 Selection of operating mode

LIN103 operating mode can be selected using the 6 dip-switches on the front panel of the device:

- Driving of the SCHUKO sockets via LAN Ethernet (MODE 2)
- Driving of the SCHUKO sockets via RS232 serial line (MODE 3)
- Setup Mode or RS232/Ethernet 10baseT bi-directional converter (MODE 1)

In MODE1, there is also a fourth operating mode:

- SETUP (configuration) mode in which the communication parameters of the LIN103 in relation to the LAN and RS232 interfaces are defined

1.2 Indications on the LEDs

The leds on the front part of the LIN103 provide the following indications:

Red led **ETHERNET**	normally off, switches on when a collision condition is detected on the Ethernet network and remains on as long as this condition lasts
Green led **Rx**	normally on, switches off when data are received from LAN

The 8 status SCHUKO leds indicate the relays status as written in the table below.

In normal operating mode	The RUN led emit a short flash each 3 seconds to indicate the ON condition
In the configuration phase (SETUP button pressed)	The RUN and STATUS leds flash
When a SCHUKO socket is energized	The red led relating to the SCHUKO socket switches on
When a SCHUKO socket is de-energized	The red led relating to the SCHUKO socket switches off

1.3 Connection of the RELAY terminals

Each SCHUKO socket is normally disconnected from power supply; when activated it can support a maximum load of 6A at 230Vac.
The corresponding led to each SCHUKO socket shows the activation.

1.4 Function ALL OFF / ALL ON

The 8 schuko sockets can all be activated or disactivated by the front push button by simply pushing it. Normally it doesn't interfere with the functioning, this push button can be used at any time to test the schuko functionality.

1.5 Electrical characteristics.

The presence of the 8 schuko sockets in the equipment has imposed the necessity of connecting then to the 220 Vac line.

So extreme care must be taken in case the equipment is opened.!
Be sure to disconnect the power cord from the main plug.

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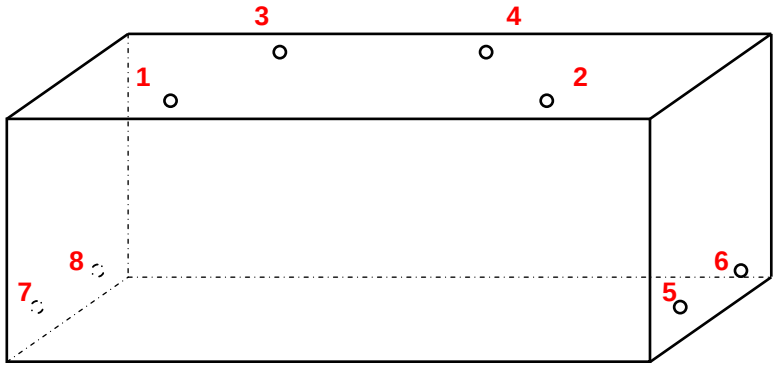
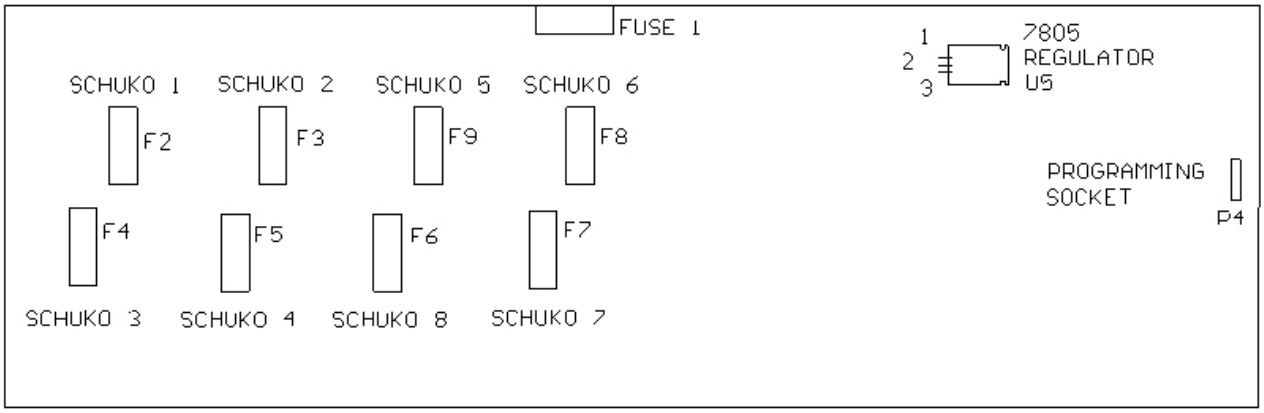
The 8 schuko sockets have each a security fuse.
In case of overload the fuse can blow up and must be changed.

Before doing this operation **"BE SURE TO DISCONNECT THE POWER CORD FROM THE MAIN PLUG."**

Opening of the equipment is simply done by unscrew 8 small screws as follows.



Once the equipment is opened the blow out fuse is located as follow:



FUSE POSITIONS

Changing the fuse is simply done by opening the black cap of the fuse and changing it with a 5x20mm 6A fuse.

There is also a power supply protection which is FUSE1 in case that no leds is on and once the main power supply has been checked as present is necessary to change this fuse, the fuse is a 5x20mm 500mA fuse.

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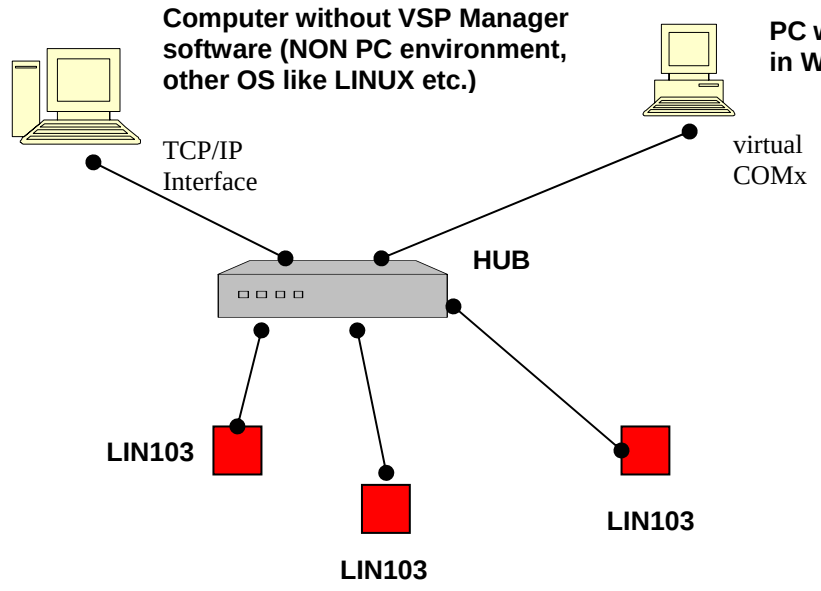
2. RELAY INTERFACE ON ETHERNET LAN

In this operating mode, before connecting the LIN103 to the network, the network parameters must be configured (IP address, operating mode, etc.) and also the parameters of the serial line which, in this case, is used inside the device and must be set with mandatory parameters (indicated below).

Generally, possible methods of use of the LIN103 on a LAN are as follows:

- in the PC environment, using the VIRTUAL SERIAL PORT Manager software, it is possible to control the LIN103 as if this is connected directly to a COM of the PC. In this case, using the VSP Manager software, virtual COMs are created that can be managed in the same way as the physical COMs of the PC.
- In other environments in which the Windows O.S. is not used, the LIN103 can be interfaced directly using the TCP/IP and UPD/IP protocols.



LIN103 on Ethernet LAN

2.1. Configuration on Ethernet LAN

Configuration of the LIN103 for use in the PC environment using the VSP Manager software to create virtual COMs is described below
The LIN103 is configured via its serial port, connecting it to a PC on which the DS Manager configuration software is installed.

Refer to Appendix **A. Characteristics of the LAN connection** for further details of the meanings of the Ethernet configuration parameters and of operating mode.
A short outline of LIN103 configuration is provided below (for those already acquainted with the problems of an Ethernet network).

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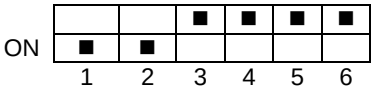
First of all, set **RS232/LAN INTERFACE (MODE 1)** mode, which also performs the function of **setup** mode, on the dip-switches of the LIN103 with the following configuration:

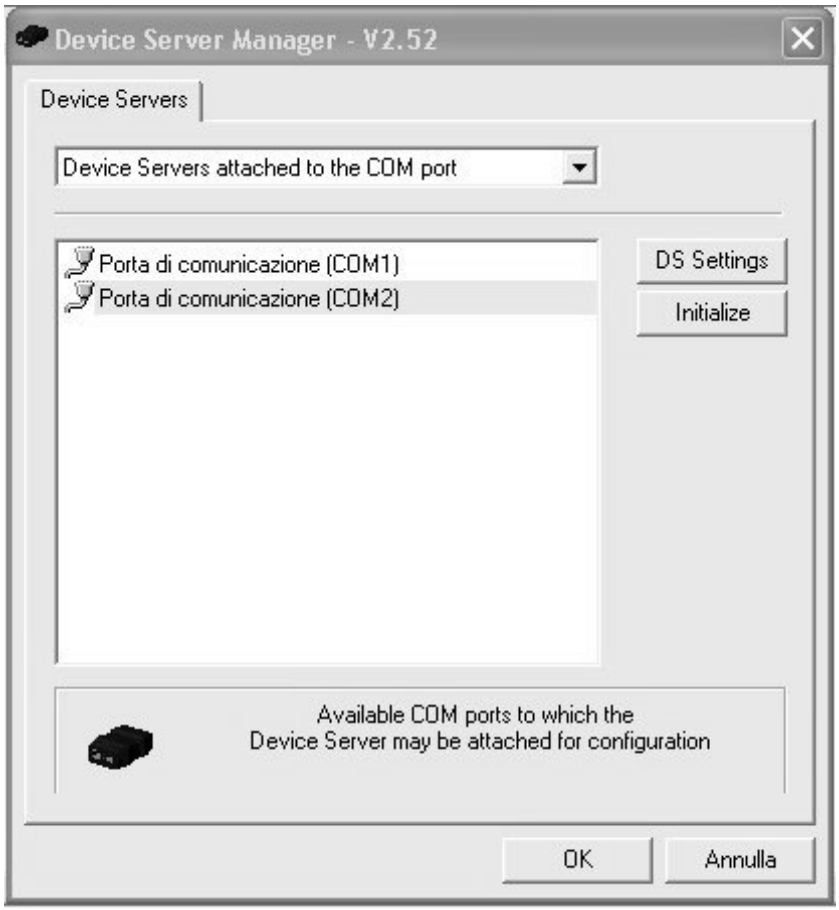


Then connect the LIN103 to the PC using a serial cable of the following type:

PC side	**LIN103 side**
(Tx) 3	2 (Rx)
(Rx) 2	3 (Tx)
(GND) 5	5 (GND)
(CTS) 8	7 (RTS)
(RTS) 7	8 (CTS)

Power the LIN103, wait a few seconds and press the SETUP button on the rear panel of the LIN103 (the green RUN and STATUS leds flash); in this way, the LIN103 is ready for setting of the new configuration.

At this point, run the DS Manager configuration program that will display the following window:



The initial screen page of the Device Server Manager program asks for the COM on which the LIN103 to be configured is connected.

Select the COM, click on DS Settings

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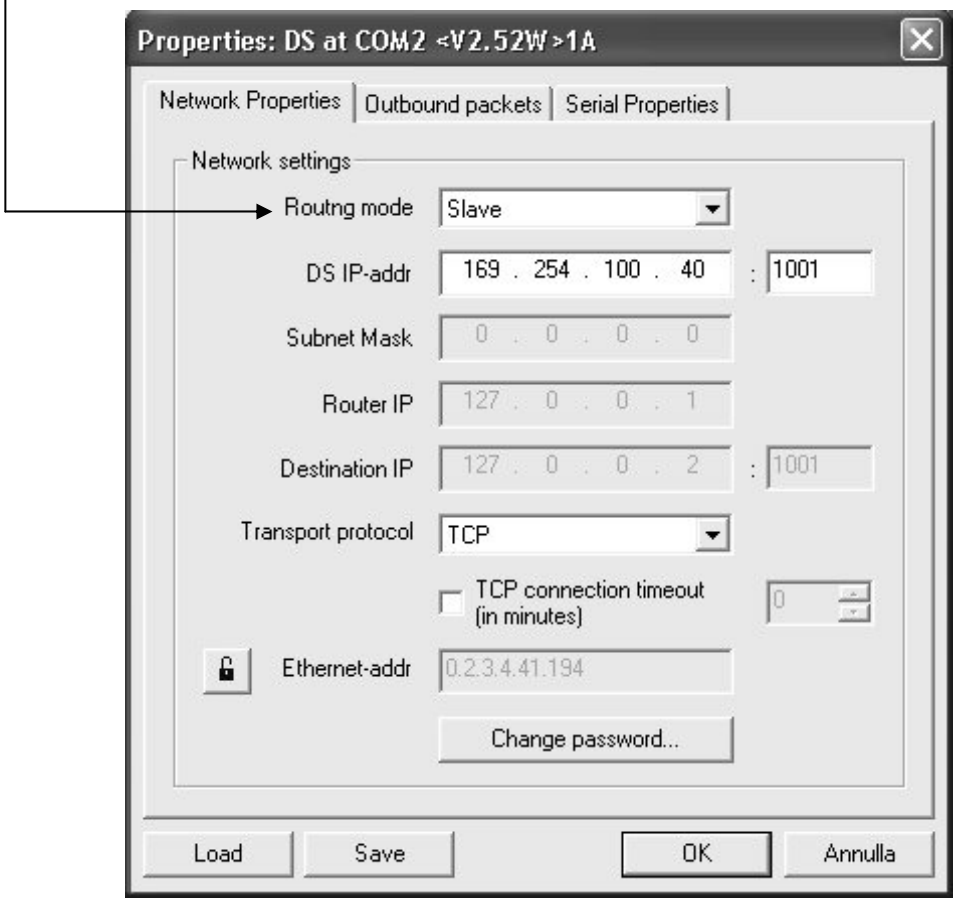
In this phase, the address and network protocol with the characteristics of the packets must be defined.

In the example below, the IP address is set (this must be compatible with the type of LAN in which the LIN103 will be installed) and no time-out is set on the TCP session, i.e. the application that controls the relays of the LIN103 can maintain control indefinitely

In this window, the mandatory parameter that **must be set** is as follows:

- Operating mode must be **Slave Routing Mode**



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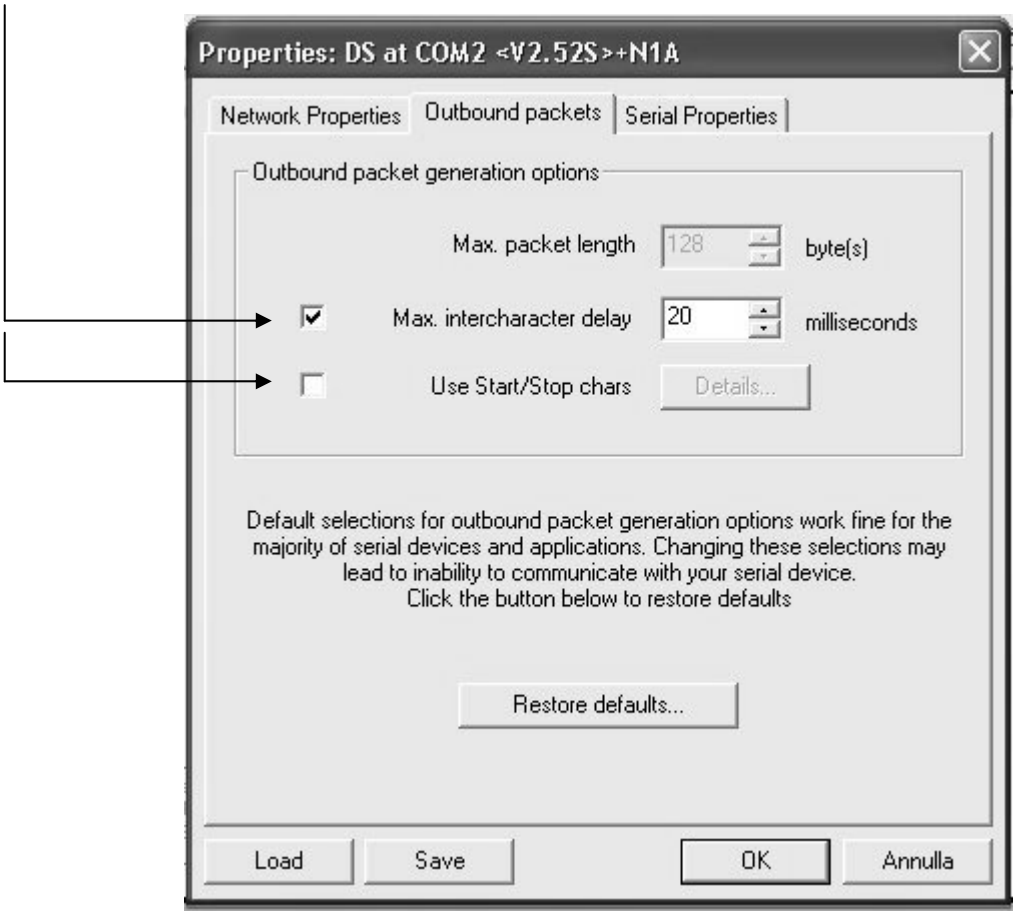
The packet characteristics setting window, Outbound packets, **must be** configured as follows:

- The TCP packet is completed after the set time-out of 20 ms.
- Start and Stop characters must not be defined



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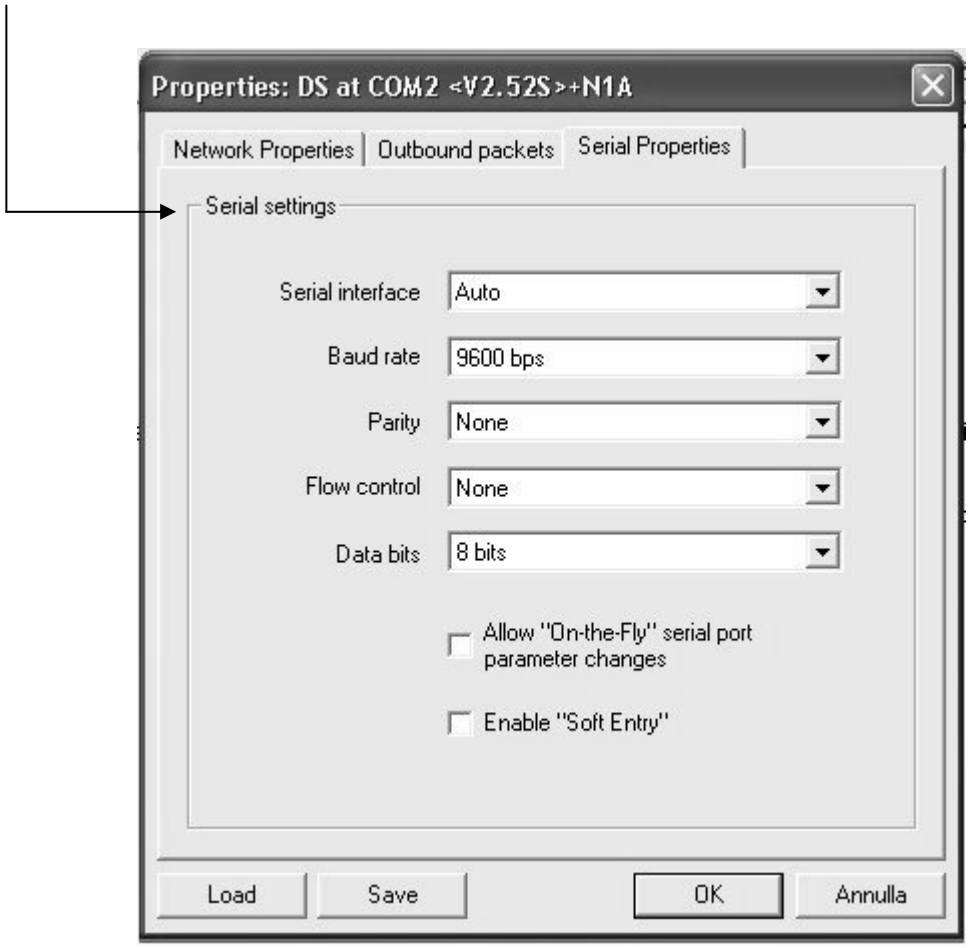
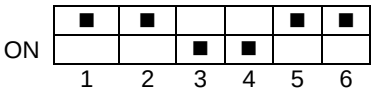
The characteristics of the serial line, Serial Properties which, in this case, is used internally and which must **necessarily** be configured with the following parameters, are defined:

- Baud rate: 9600 bit/sec
- Parity: none
- Flow control: none
- Data bits: 8



At this point, the data can be confirmed and these will be transited to the LIN103 where they will be saved with two consecutive OKs.

The configuration of the LIN103 is now complete and installation in the network can be performed. To do this, switch off the LIN103 and set the mode selection dip-switches for functioning on **Ethernet network (MODE 2)**:



The LIN103 can now be connected to a port of the network hub .
In this operating mode, no cable must be connected on the serial port of the LIN103.

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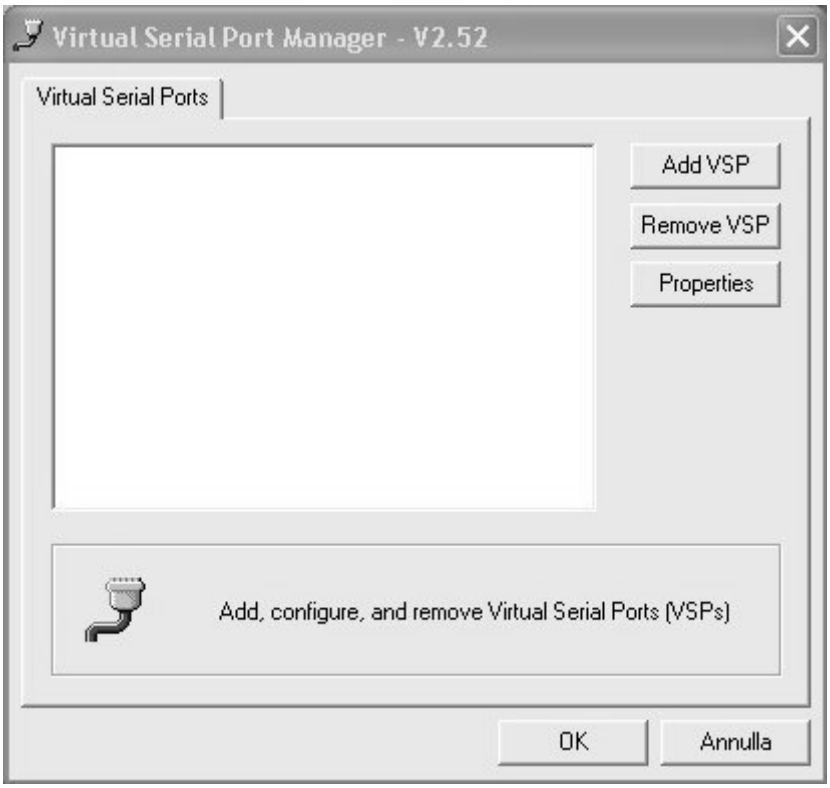
2.2 Virtual COM configuration

A virtual COM to which to associate the IP address of the LIN103 that has just been configured must be created on the PC where the relay management software is installed.

The COM is created with the Virtual Serial Port Manager function of the VSP Manager program



After clicking on Add VSP, the Properties screen page is displayed.
Association is performed indicating the number of the COM that will be used by the management program while, as regards the LIN already configured previously, the type of protocol, the IP address and the number of the Data Port used must be indicated. See the example given below.

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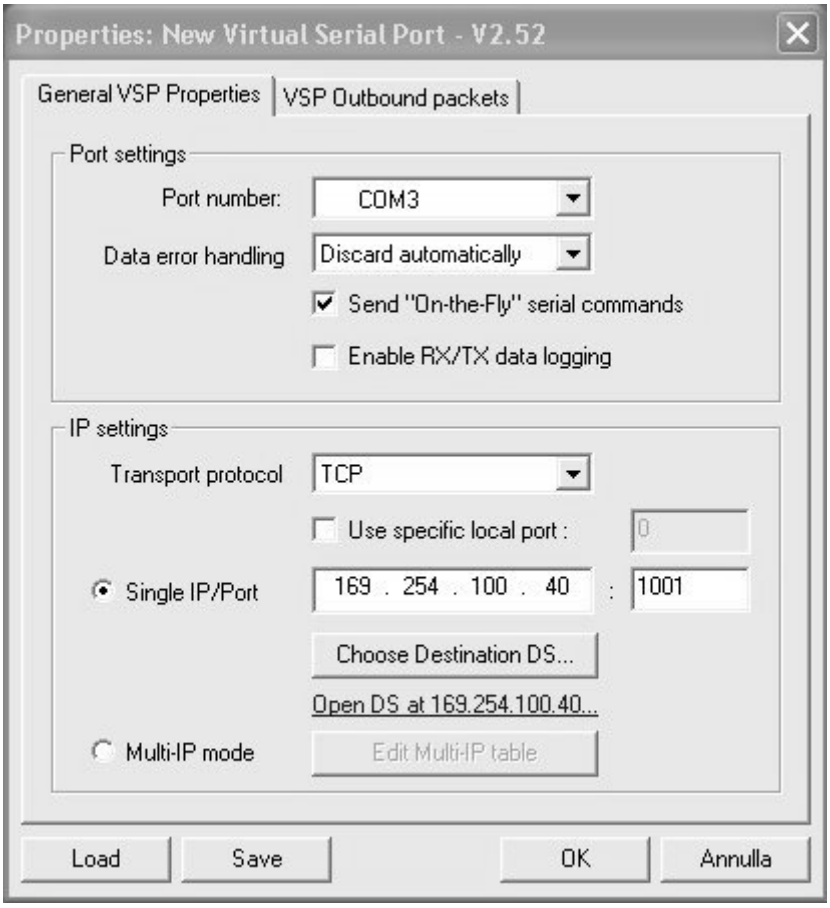

Confirm the data with 2 consecutive OKs.
At this point, the SCHUKO socket management software can interface the LIN103 via COM3 as if it is a serial port really installed on the PC.

To manage the SCHUKO socket, start the LIN103 software included in the DST (Device Server Toolkit) package or implement the protocol described in chapter 4 on the PC.

Note: after configuring the LIN103 and connecting this in the network, correct functioning can be checked using the PING command. In the PC environment, this is possible via the DOS prompt using, for the previous example, the ***ping 169.254.100.40*** *command*

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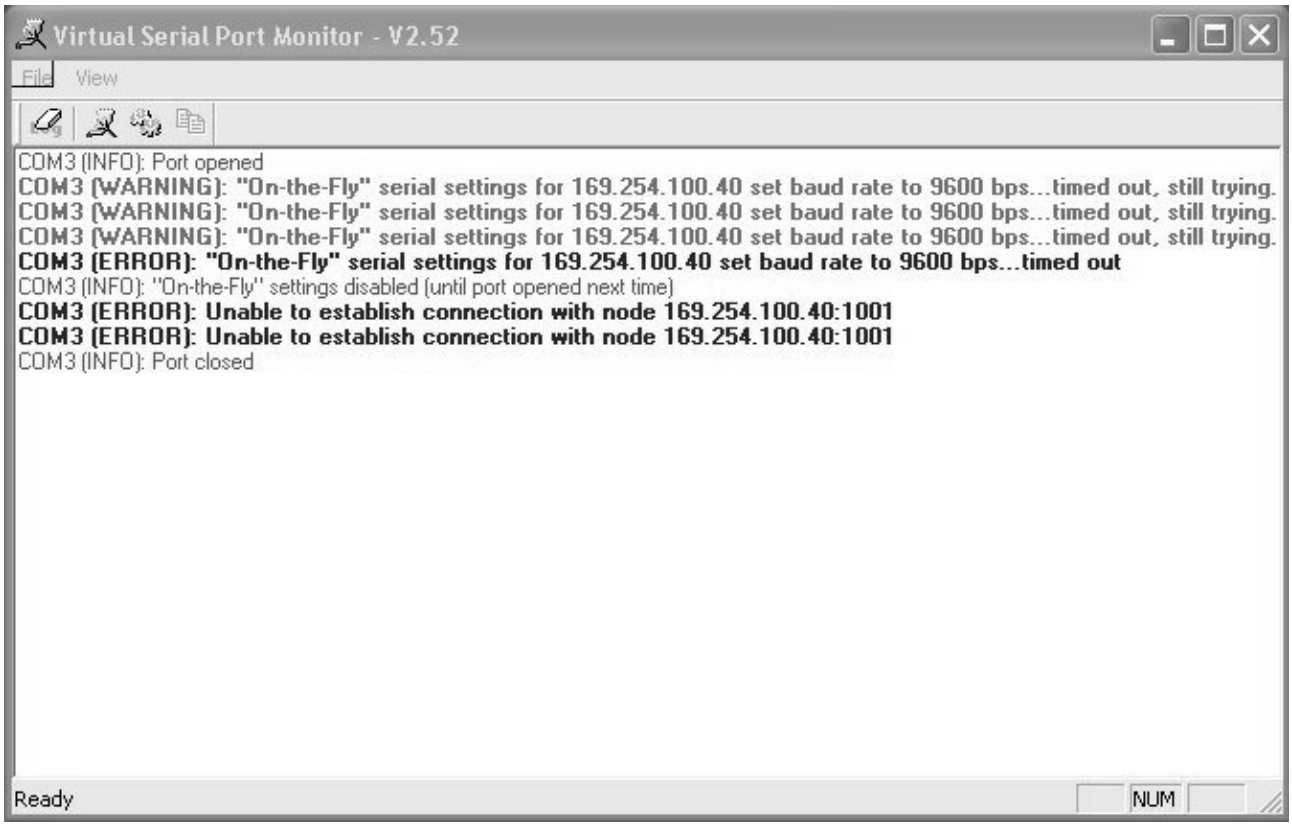
2.3 Port Monitor Log

In the installation and test phase, the VSP Monitor Log software is particularly useful as it logs the events that occur on the virtual COMs configured; the VSP makes it possible to display information about errors, warnings and messages in a window in real time.



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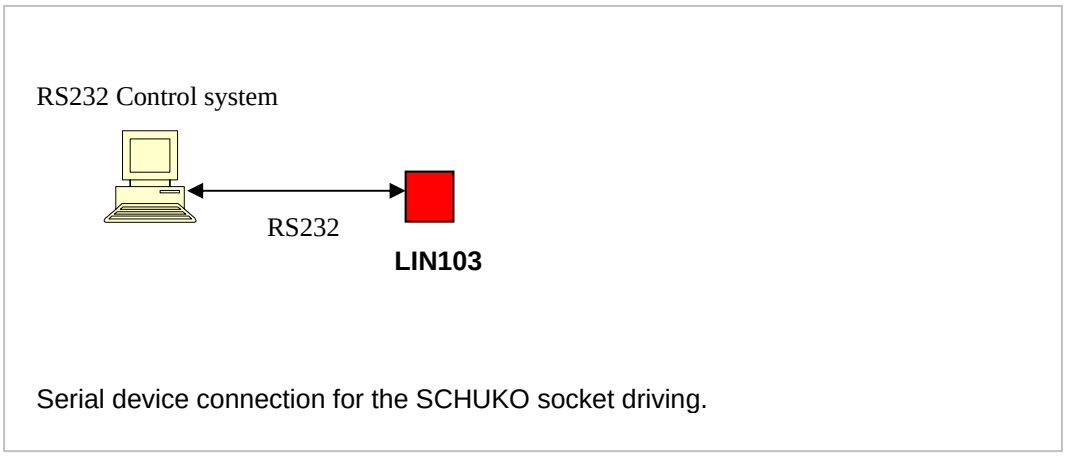
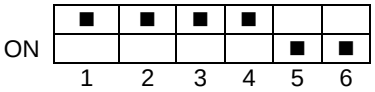
3. RELAY INTERFACE VIA RS232

The LIN103 makes it possible to drive the relays using its RS232 serial port.



Serial device connection for the SCHUKO socket driving.

No configuration of the LIN 103 is required in this operating mode. All that is necessary is to set the mode selection dip-switches for functioning via **RS232 serial (MODE 3)**:



The characteristics of the serial interface with which the communicate with the LIN103 are as follows:

- **Baud rate:** **9600 bit/sec**
- **Parità:** **none**
- **Flow control:** **none**
- **Data Bit:** **8**
- **Stop Bi:** **1**

The serial connection uses only three wires (as there is no hardware flow control):

PC side	LIN103 side
(Tx) 3	2 (Rx)
(Rx) 2	3 (Tx)
(GND) 5	5 (GND)

In this operating mode, the red ETHERNET (collision) led is not significant; **remember not to connect any cable to the Ethernet port of the LIN103.**

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4. COMMUNICATION PROTOCOL

The LIN103 manages the commands for driving the SCHUKO sockets (described below) when it is set to serial or LAN operating mode. In transparent operating mode, no type of command relating to the relays is managed.

	Status request		
	Command:	Response:	Where: s1…s8 indicate the state of SCHUKO socket . 1…8: **O** (hex **4F**) SCHUKO socket disactive **C** (hex **43**) SCHUKO socket active
Ascii	**D <CR>**	**D** s1 s2 s3 s4 s5 s6 s7 s8 **<CR>**	
Hex	**44 0D**	**44** s1 s2 s3 s4 s5 s6 s7 s8 **0D**	

	SCHUKO socket activation		
	Command:	Response:	Where: nr indicate the SCHUKO socket number: **1** (hex **31**) SCHUKO socket 1 **2** (hex **32**) SCHUKO socket 2 **3** (hex **33**) SCHUKO socket 3 **4** (hex **34**) SCHUKO socket 4 **5** (hex **35**) SCHUKO socket 5 **6** (hex **36**) SCHUKO socket 6 **7** (hex **37**) SCHUKO socket 7 **8** (hex **38**) SCHUKO socket 8 **A** (hex **41**) All SCHUKO socket
Ascii	**C** nr **<CR>**	**<ACK>**	
Hex	**43** nr **0D**	**06**	

	SCHUKO socket disactivation		
	Command:	Response:	Where: nr indicate the relay number: **1** (hex **31**) SCHUKO socket 1 **2** (hex **32**) SCHUKO socket 2 **3** (hex **33**) SCHUKO socket 3 **4** (hex **34**) SCHUKO socket 4 **5** (hex **35**) SCHUKO socket 5 **6** (hex **36**) SCHUKO socket 6 **7** (hex **37**) SCHUKO socket 7 **8** (hex **38**) SCHUKO socket 8 **A** (hex **41**) All SCHUKO socket
Ascii	**O** nr **<CR>**	**<ACK>**	
Hex	**4F** nr **0D**	**06**	

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	ID request		
	Command:	Response:	Then LIN103 identification is **U1**
Ascii	**i <CR>**	**i U 1 <CR>**	
Hex	**69 0D**	**69 55 31 0D**	

If the command sent to the LIN103 is not correct (for example, due to transmission errors), it will reply with the **<NAK>** character or Hex **15**

Therefore, any sequence of characters closed with **<CR>** is considered as a command string and interpreted.

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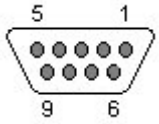
5. CONNECTIONS

I/O connectors pin assignment

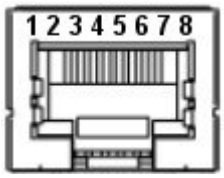
Serial port: 9 pin fem.

Pin	Signal
1	no connection
2	Rx
3	Tx
4	internally connected to pin 4
5	GND
6	internally connected to pin 6
7	RTS
8	CTS
9	no connection



Ethernet port 10BaseT: RJ45 8 pin fem.

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
4	no connection
5	no connection
6	Rx-
7	no connection
8	no connection



Ethernet wiring

Wiring between LIN103 and HUB	
Side A	**Side B**
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Wiring between two LIN103	
Side A	**Side B**
1	3
2	6
3	1
4	4
5	5
6	2
7	7
8	8

Note: wire **1** and **2** twisted pair
wire **3** and **6** twisted pair

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6. TECHNICAL SPECIFICATIONS

SCHUKO LOAD (single)	: 5A at 230Vac
SCHUKO fuse link	: T 6A
Maximum SCHUKO load (total)	: 10 A at 230Vac
Ethernet interface	: 10 Base T
Network cable	: CAT5
Network Protocols:	: UDP, TCP, ICMP, ARP
Data buffer size	: 2 independent of 255 bytes
Serial interface	: RS232
Signals	: RxD TxD
Serial speed	: fixed 9600 b/s
Transparent mode signals	: RxD TxD, RTS, CTS
Transparent mode speed	: from 150 b/s to 115200 b/s
Main input	: 230Vac 50Hz (115Vac 60hz on request)
Power consumption	: 9 VA
Size (WXDXH)	:190 x 486 x 135 mm
Weight	: 3 Kg
Operating temp. range	: 0 ÷ 45°C
Safety	: according to EN 60065
EMC	: according to EN 55103-1 and EN 55103-2 EN 50081 part1 and 50082 part 1

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APPENDIX A. Characteristics of the LAN connection

A.1 LAN Port

The Ethernet port of the LIN103 is of the 10Base T type and, similarly to any other appliance, each LIN103 has its own univocal Ethernet (MAC) Address and must have its own valid IP address in order to function correctly in the network. The LIN103 has two logical ports, one that can be defined by the user, called Data Port, used to exchange data with other network appliances, and a predefined port, called Command Port, with a fixed address 65535 (FFFF hex), used to send the programming of the LIN103 via the network.

The LIN103 can exchange data with remote stations using the TCP/IP or UDP/IP protocol (according to the configuration of the Transport Protocol parameters) and can operate both as master and slave. Other settings refer to the IP address, the address of the destination Data Port, the IP address of the gateway, the NetMask and the connection time-out.
In addition to the TCP and UDP protocols, the LIN103 also supports ARP and ICMP (ping).
This makes it possible to send a 'ping' to any other appliance of the network in order to check effective connection.

A.2 RS232 Port

The serial port of the LIN103 supports TX, RX, CTS, and RTS signals and can work at baudrates up to 115200. In Transparent Mode (MODE 1) the serial port transmits the data between the LIN103 and attached serial device (microcontroller). In the Serial Programming Mode the port is used to program the LIN103's Settings. Settings that define the operation of the serial port include the Baudrate (150~115200bps), Parity (none, even, or odd), Bits Per Byte (7 or 8), and Flow Control (none or CTS/RTS). Each of these Settings has a matching Parameter that overrides the value of a corresponding Setting.

A.3 Routing Buffers

The data between the Ethernet port and the serial port is routed via two independent 255-byte buffers, one for each routing direction. Buffers are necessary because the Ethernet and the serial port operate at different speeds and in different ways. Ethernet carries the data in "packets" (i.e. groups of data), while the serial port sends and receives a serial "stream" where each data byte is independent. Here is how the LIN103 transforms the Ethernet packets into the serial stream and back:

- Ethernet serial data routing is simple: the LIN103 outputs the contents of arriving Ethernet data packets byte by byte via the serial port. The LIN103 does not check of filter the contents of data being routed in the Ethernet -> serial direction

- Serial Ethernet routing requires grouping arriving serial data into packets and is more complicated. Several Settings define exactly what serial data is accepted into the buffer and when and how this data is combined into an Ethernet packet and sent out. Detailed information on the subject can be found in Serial -> Ethernet data routing.

A.4 Slave and Master routing modes

The LIN103 routes the data in one of two modes as defined by the Routing Mode Setting:

- In the Slave Routing Mode the LIN103 never sends any data transmission in the serial port -> Ethernet direction before it receives some data from the remote station first (i.e. the data in the Ethernet -> serial direction). The serial data received into the LIN103's serial port before the remote station "contacts" the LIN103 is discarded. In the Slave Mode the LIN103 will "work" with any station on the network that contacts it

- In the Master Routing Mode the LIN103 does not wait for the remote station to send the data first and routes the data in the serial -> Ethernet direction as soon as there is a data to be sent. The data is always sent to a specific destination (as defined by the Destination IP-address and Destination Data Port Number Settings of the LIN103). Also, the LIN103 only accepts the data sent from the remote station whose IP-address matches the one set in the Destination IP-address. The LIN103 will discard the data sent from any other IP. Note, that data port number of the sender is not verified so the data can be sent from any port.

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A.4.1 Using Slave and Master Routing Modes

Use the Slave Routing Mode to network-enable serial devices that never send out the data by themselves but instead are "polled" for data from the PC. Examples of such devices are time recorders, access control panels and other "hardware terminals".

Use the Master Routing Mode to network-enable serial devices that send out the data "spontaneously" i.e. without waiting for the request from PC.
Also use the Master Routing Mode in cases when the serial data must flow independently in both directions (i.e. Ethernet -> serial and serial -> Ethernet). This is the case, for instance, when you are creating a "network modem" that must pass the data in both directions simultaneously.

A.4.2 Required network settings for the Slave and Master Routing Modes

In the Slave Routing Mode the LIN103 only "responds" to other stations on the network. When the LIN103 receives the data from remote station it memorizes this station's IP-address and data port number. When routing the data in the serial -> Ethernet direction the LIN103 will reply to this IP-address and data port number. Therefore, the only network settings that must be set in the Slave Routing Mode are the LIN103's own IP-address and the Data Port Number. This is true even if there is a router between the remote station and the LIN103. You don't have to set the Netmask and Gateway IP when using the LIN103 in the Slave Routing Mode;

In the Master Routing Mode the LIN103 needs to be able to send the data to a predefined remote station at any time. This means that not only LIN103's own IP-address and Data Port Number must be set but also the Destination IP-address and the Destination Data Port Number. If the destination remote station and the LIN103 are residing in different network segments then the Netmask and Gateway IP-address must also be set.

A.4.3 Slave and Master routing modes vs. UDP/IP and TCP/IP transport protocols

UDP/IP and TCP/IP provide completely different data transmission so LIN103's behavior in the Slave and Master Routing Modes is slightly different under UDP/IP and TCP/IP Transport Protocols.

- **UDP/IP Transport Protocol**
    - Slave Routing Mode.
      All UDP data packets arriving from any remote station and addressed to the Data Port of the LIN103 are routed to the serial port. For the serial -> Ethernet direction the LIN103 always sends the data to the IP-address and the port number that were received in the last (latest) UDP packet. Once the LIN103 receives a UDP packet from a different station it will start sending all its serial -> Ethernet data to this new station. After power up and before the LIN103 receives the first UDP data packet the LIN103 doesn't have any IP-address and port number to send the data to so all the data received into the LIN103's serial port is simply discarded.
    - Master Routing Mode.
      The LIN103 only accepts and routes to the serial port the data packets that have originated from the remote station whose IP-address matches the one defined by the Destination IP-address Setting. Source data port number need not match the one defined by the Destination Data Port Number Setting so the packet can be sent from any port. Whenever the LIN103 has the data to transmit in the serial -> Ethernet direction it will send the data to the Destination IP-address and Destination Data Port Number. *The packet will be sent to the Destination Data Port Number even if the packet received by the LIN103 from the remote station originated at a different port. Therefore, it possible that the LIN103 will be receiving the data from one port but sending it to another port!*
- **TCP/IP Transport Protocol**
    - Slave Routing Mode.
      The LIN103 will accept an incoming TCP connection from any station on the network. The LIN103 will not attempt to establish a connection with a remote station by itself even it the LIN103 has the data to transmit in the serial -> Ethernet direction. Once the remote station has established the connection the

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data can flow independently in either direction. Pending serial -> Ethernet data received by the LIN103 prior to the TCP connection establishment is discarded when the connection is established.

- Master Routing Mode.
  The LIN103 will both accept an incoming TCP/IP connection and attempt to establish a connection with the remote station by itself depending on which side sends that data first- remote station or attached serial device. Incoming TCP connection will only be accepted from a station whose IP-address matches the one defined by the Destination IP-address Setting of the LIN103. Source port number need not match the one defined by the Destination Data Port Number Setting so the connection can be initiated from any port. When the LIN103 needs to initiate a TCP/IP connection the it will attempt to connect to the Destination IP-address and Destination Data Port Number. Once the connection has been established the data can flow independently in either direction. Note that unlike in case of UDP/IP there will never be a situation when the LIN103 receives the data from one port but sends the data to another port. Once the TCP/IP connection has been established both sides exchange the data using a single port on each side.

A.4.4 Connections with more than two nodes

In many real-life situations it is often necessary to have several PCs (network stations) access the same serial device through the LIN103 ("many clients to one data source") or have many serial devices (each connected to the network via its own LIN103) send the data to a single PC ("many data sources to one client").

- **Many clients to one data source** operation is achieved by using the LIN103 in the Slave Routing Mode. The LIN103 will reply to any sender in this mode, so any station will be able to access the host serial device with the LIN103 inside.
  - UDP/IP Transport Protocol should not be used if there is a chance that several different clients will send the requests to the same LIN103/serial device at the same time. Data mix up will result on the serial side and the LIN103 won't be able to route the data back to the respective sender of each command correctly.
  - TCP/IP Transport Protocol can be used safely since when one client is already connected to the LIN103 others won't be able to gain access to the same LIN103 until this client disconnects. To prevent one client from holding the TCP/IP connection to the LIN103 indefinitely there is a Connection Timeout Setting that defines after how long the LIN103 will abort the connection in case there is no data transfer in any direction.
- **Many data sources to one client** operation is achieved by using the LIN103 in the Master Routing Mode. In this mode the LIN103 will route all its serial -> Ethernet data to the Destination IP-address and Destination Data Port Number. Any number of LIN103s can be set to send the data to the same destination.
  - UDP/IP Transport Protocol can be used in this arrangement but you must make sure that each serial data block output by the serial device is sent out in a single UDP packet. Potential data mix up can occur on the receiving end if the serial data block is transmitted in several UDP packets and several LIN103 are sending data at the same time. The upside of using the UDP/IP is that you will only need to maintain one listening socket on the receiving end to get the data from all data sources (unless, of course, you want to distinguish between the data sources). Several LIN103's Settings define how the incoming serial data is combined into Ethernet packets so you can make sure that the serial data block from is not split into several packets (see serial -> Ethernet data routing for details).
  - TCP/IP Transport Protocol can be used safely but you will have to maintain a separate socket on the receiving end for every data source sending the data.

A.5 Serial to Ethernet data routing

The LIN103 provides a way to choose which incoming serial data is accepted into the serial -> Ethernet buffer, how this data is combined into Ethernet packets and when it is sent out via the Ethernet port.

The LIN103 treats all incoming serial data as a sequence of data blocks. The term "data block" here does not mean that the LIN103 is only capable of working with a structured serial data. An absolutely random serial stream can also be processed- as one continuous infinite serial data block. Serial data blocks begin when a start condition is detected and end when a stop condition is detected. After the start condition is detected the LIN103 begins recording the incoming serial data into the serial -> Ethernet buffer. Thus, the start condition is said to open the serial data block. When the stop condition is detected the LIN103 seizes recording the data into the buffer and attempts to send out all the data

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accumulated in the buffer via the Ethernet port. Therefore, the stop condition closes the serial data block. The inter-block serial data i.e. the data received after the stop condition is detected and before the next start condition is detected is discarded. Besides the start and stop conditions there is also a break condition. When the break condition is detected the LIN103 doesn't close the serial data block (i.e. it continues recording subsequent serial data into the serial -> Ethernet buffer) but sends out the data already accumulated in the buffer through the Ethernet port. Break conditions provide a way to subdivide large serial data blocks.

A.5.1 Start conditions

The Start On Any Character Setting defines if the LIN103 recognizes any character received into the serial port as a start condition or requires a predefined Start Character to open the serial data block.
When Start On Any Character is set to "yes" the LIN103 will accept any character following the end of the previous serial data block as the beginning of the next block. When Start On Any Character is set to "no" the LIN103 will only open the serial data block when one of the preset Start Characters is received. Up to three different Start Characters can be defined. Start Characters received after the serial data block has been opened are treated as normal characters and do not "restart" the serial data block.

A.5.2 Stop conditions

Up to three different Stop Characters can be defined to close the serial data block. Once one of the preset Stop Characters is detected the LIN103 closes the serial data block and attempts to send out the contents of the serial -> Ethernet buffer via the Ethernet port. All subsequent serial data is ignored until the next start condition is met.
The use of Start Characters and Stop Characters assumes that these characters will not be encountered in the data block body. Some communications protocols use checksums (or other forms of data integrity verification). Checksum can potentially take any value and occasionally match the ASCII codes of the Stop Characters.
To avoid possible confusion some communications protocols put the checksum bytes *behind* the Stop Characters. The LIN103 deals with this by allowing to define a Number Of Post-characters for each enabled Stop Character. For example, if the Number Of Post-characters for a certain Stop Character is set to 2 then the LIN103 will additionally receive and count as belonging to the current serial data block 2 bytes of data after this Stop Character has been encountered.

A.5.3 Break conditions

The Maximum Data Length Setting defines the maximum number of data bytes in the serial -> Ethernet buffer. (can be set between 32 and 255). Once this number is reached the LIN103 attempts to send out the contents of the buffer via the Ethernet port. This Setting only works when the UDP/IP Transport Protocol is selected. This is because TCP/IP has its own way to determine what size of data chunks is best for transmission over the network.

The Maximum Intercharacter Delay Setting defines the maximum time gap between the arrival of two consecutive serial characters into the serial port (can be defined in 10ms increments between 10ms and 2.55 sec). Once this time is exceeded the LIN103 attempt to send out the contents of the serial -> Ethernet buffer via the Ethernet port. Setting the maximum Intercharacter Delay to 0 disables the function.

A.5.4 Default configuration

The default configuration is the follow:

- *Start On Any Character*
- no *Stop Characters* are defined
- *Maximum Intercharacter Delay* is 10 ms
- *Maximum Data Length* is 255 byte (UDP only).

As a result the very first byte received into the serial port is regarded as a beginning of the serial data block that never ends. Once there amount of data in the serial -> Ethernet buffer reaches the limit or there is a gap in the serial transmission the LIN103 combines all serial data it has already received and sends it out.

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Practice shows that this arrangement works very well not only for a random data flow but also for structured data.

A.5.5 Buffer-related issues

When using the LIN103 be careful not to overflow its internal Ethernet -> serial and serial -> Ethernet buffers. The overflow can occur because of the difference in receive/transmission speeds on the Ethernet and the serial sides of the LIN103 (Red Status LED blinks momentarily when overflow happens). In addition, the internal receiving buffer of the host serial device can potentially overflow if the LIN103 outputs the serial data too fast.

- **Ethernet -> Serial buffer**

  - UDP/IP Transport Protocol. The Ethernet -> serial buffer can easily overflow because the Ethernet is much faster than the serial port and UDP/IP has no inbuilt protection against buffer overflows. UDP/IP should not be used to send continuous data flow and is only suitable for sending short data blocks that can fit in the buffer.

  - TCP/IP Transport Protocol has an inbuilt protection from buffer overflowing. You can safely send the data of any size.

- **Serial -> Ethernet buffer**

  the only way to protect the buffer is to enable the RTS/CTS Flow Control in the LIN103 and on the host serial device. This way the LIN103 will be able to signal the host serial device to stop transmitting the data once the buffer becomes full.

- **Internal receiving buffer of the host serial device.**

  this buffer can also be protected by using the RTS/CTS to regulate the exchange of data between the LIN103 and the serial device.

Note: using TCP/IP and RTS/CTS is the most reliable way of transmitting data through the LIN103

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