

Operating instructions

WinPP101 test program

Receive, check, filter, store, display, print, transmit and simulate IEC 60870-5-101 messages.

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1 Installation

Note: For the driver installation with Window 2000, NT, XP or Vista you must log on as Administrator.

System Requirements: Windows 95, 98, Me, 2000, NT 4.0, XP or Vista, 32 MB RAM, 40 MB Disc, VGA or better, at least one COM (USB-Serial is possible) and LPT or USB for dongle.

The setup program of WinPP101 is delivered on CD. On the CD the program is in the folder "Programme".

The file name is SetupW101vvv.exe, vvv stands for program version.

Par example: SetupW1012300.exe = Setup program for WinPP101 Version 2.3.0.0.

Insert the CD into the drive and start the program "SetupW101vvv.exe", then follow the instructions on the screen.

The program makes an entry in the Program directory of the Start Menu for starting WinPP101. You can deinstall WinPP101 via the dialogue field "Properties of Software" (Menu: *Start | Settings | System Control | Software*).

After installation the following files are in the chosen directory:

Winpp101.exe	Test program
W101Text.ger	Program texts in German, compressed
W101Text.usa	Program texts in English, compressed
W101ger.hlp	German Online Help
W101ger.cnt	German Online Help
W101usa.hlp	English Online Help
W101usa.cnt	English Online Help
CbSetup.exe	Auxiliary program, installs the dongle driver.
ExText1.csv	File example for text of objects.
Typ1ger.csv	File example for short texts of message types, German.
Typ1usa.csv	File example for short texts of message types, English.
1Version.txt	Versions log of WinPP101 (German).
Log.lg1	Standard Log file for online messages.
SeTel.st1	Standard file for transmission messages and lists.

You can also save Log files, and the files for transmission messages and lists, under your own choice of name for reloading later. Do not add the file extensions ("lg1" or "st1") as the program automatically appends them.

On exiting the program it saves the configuration specific to your PC in the file W101.cfg.

2 Overview

2.1 Function

WinPP101 is a test program for the telecontrol protocol IEC 870-5-101. It receives, tests, filters, stores, prints and transmits IEC 870-5-101 messages. Additionally, it can listen and logically output ABB RP570 and RP571 telegrams. For test purposes it can also be used as a "Format 1.2" or as a "Byte" receiver, here the parity, number of data bit and stop bit are to be parameterised, see Parameterize Rec/Trans 1 | Function.

The program can also be used without administrator rights.

Upon the first start, the program creates the "Data Directory" under "C:\MyDocuments\Users\User Data\PPFink\WinPP101\" and copies the "Log.lg1" and "SeTel.st1" files into the directory. The "Data Directory" is used for saving the log, send and configuration data. You can change the directory with the menu „Parameterize | General | Data directory“.

Interfacing to the telecontrol equipment is done via the serial interface COM. The program supports two COM interfaces. It is possible to run the program several times simultaneously and thus support several COM interfaces.

You can monitor an existing Link or simulate a Master or Substation. If you wish to monitor the command and monitoring directions simultaneously then you need two free COM interfaces. For simulation you need one free COM interface.

You can parameterize the following for example:

- Ø Plaintext and color of the objects (CSV-file)
- Ø Length of link address
- Ø Length of cause of transmission
- Ø Structure of station address
- Ø Structure of object address
- Ø Program function (monitoring, master, station, byte receiver)
- Ø Transmission mode (balanced/unbalanced)
- Ø Use of the single control character E5
- Ø COM Port
- Ø Baud rate
- Ø Dial up modem commands

The program reads the plaintexts of the individual objects from a CSV file, format: "Object address; Color code; Plaintext;"; see also file "ExText1.csv" in the program directory. Select your CSV file in the "File | Object Texts Load" menu. The currently used file is indicated in the status bar. Don't use the file names "BspText1.csv" and "ExText1.csv". These files are overwritten during each installation.

The program checks the received messages for transmission errors, link faults and ASDU faults. Faulty messages are marked as such. Every transmitted and received message is allocated a time stamp and is stored in a Log file.

The maximum size and the log file directory can be defined via the related parameters. As a rule, the program uses the "Log.lg1" log file. If the user activates the "Use new log file every day ..." option (see Parameterize | Options), a new log file will be created for each day of the month. The number of the day (01 - 31) is indicated in the file name. During reception, the user can page up and down the messages saved in the log file and shown on screen. A message of 20 bytes takes up 50 bytes of Log file space. The log file can be printed or saved as a text file or log file.

Start options

If no start options have been defined, the program loads the default log file and the transmit message / object text file used last. Afterwards, it starts in the same mode in which it was terminated before. The start can be influenced by setting appropriate start options. The user can specify one or several options in a freely definable order. The options must be separated by at least one blank. The following options are supported:

Option	Example
Online	online
Offline	offline
Name of transmit message file	SeTelNorth.st1
Name of object text file	ObjTextNorth.csv
Name of log file	GaNorth.lg1

When using the "Name Log File" option, it must be considered that this file will be also used on online mode.

A convenient method for the definition of start options is to extend the link on the Desktop by the options (click with the right mouse button on the link | Properties | "Destination: ..." extension with blanks and options). The program searches the files in the directory indicated in the "Execute in: ..." dialog box (see properties of the link).

Example: "c:\pp\WinPP101\WinPP101.exe online ObjTextNorth.csv SeTelNorth.st1"

The parameters used last (Baud, COM number, function, ...) are also saved in the transmit message file and in the log file.

The Log file is organised as a circular buffer. When the file is full then the newest message overwrites the oldest message. You can prevent this by deleting (Ctrl+D) the old messages, before you start testing or increase the maximum size of the Log file or limit the time for message storage or the number of stored messages via Filter.

If you start the program several times the following log files are used: Log.lg1, Log2.lg1, Log3.lg1, etc.

The message colors may be modified in one of the following ways:

- Ø Color of the receiver/transmitter (lowest priority)
- Ø Color of the transmission cause (dialog or file ExText1.csv)
- Ø Color of the ASDU type
- Ø Color of the object address, refer to the ExText1.csv object text file (highest priority).

When storing or displaying messages you can filter them with respect to: time, message number, type, station address, object address, etc.. With the time filter you can specify, for example those only messages from 02:00 till 08:00 should be stored.

The transmitted messages are parameterized logically. There are 12 messages and 12 lists available, see **Parameterize message** or **Parameterize list**. In a list you can parameterize 3000 objects. For the simulation of command responses 1000 objects are available. The transmission instigation for the messages and lists takes place via the operation **Transmit** or via an event. An event can be: reception of a particular type of message or successful establishment of a link. You can then send an interrogation command, answer a interrogation command automatically, send commands, simulate responses, transmit cyclic measured values or simulate an avalanche of messages.

For test purposes you can send illogical link and data messages. For examples: send NACK instead of ACK, do not toggle the FCB bit, use private ASDU, send the check character incorrectly, etc., see Simulate faults.

2.2 Initial start

Place the Dongle onto the parallel (LPT) or USB interface and start the program. You choose the English or German user interface with the menu "Parametrieren | Sprache". On starting the first time you should parameterize the following two dialogue fields:

General parameters

Length of link address
 Originator address
 Structure of station address (Common address)
 Structure of object address

Parameterize Rec/Trans 1

Page 1

Function
 Transmission procedure
 Link address

Page 2

COM Port for Rec/Trans
 Baud rate

Save the parameters each time by clicking "OK".
 Choose the "On-line message display" (Menu: View).
 Go On-line (Menu: Mode).
 Please note the LEDs and the status bar at the bottom of the window.

If you receive the message "e.n.n.n Dongle missing/wrong" after entering the online mode then check please:

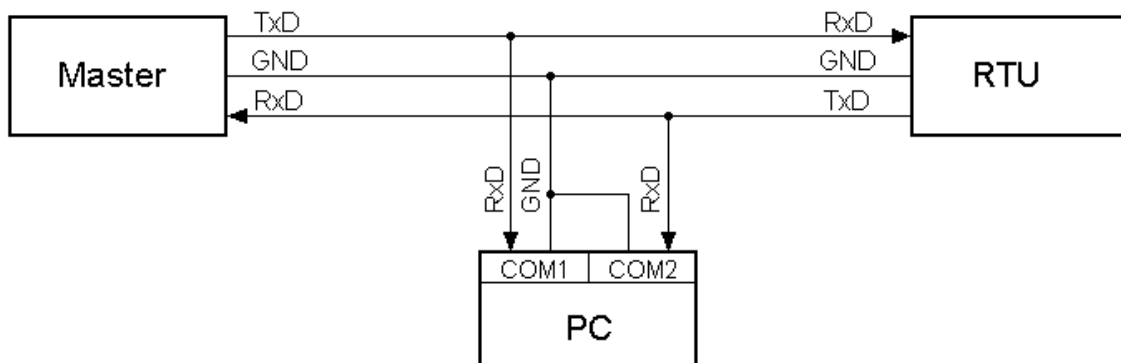
- Was the program installed with administrators' right?
- Is the dongle on LPT or USB present?
- Is the LPT-Interface enabled (BIOS-Setup)?
- Test another LPT Mode, for example: EPP, ECP or Output only, don't use bi-directional (BIOS-Setup).

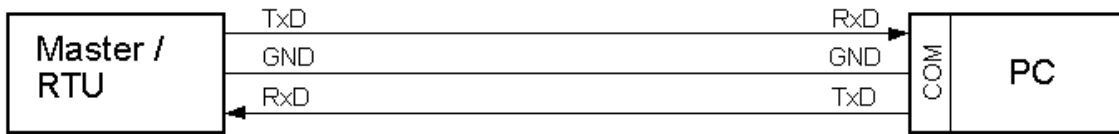
The error code e.n.n.n has the following meaning:

2, 1011 or 1034.n.n.n Dongle not found.
 1004, 1005 or 1006.n.n.n Device driver not installed.

Depending on the parameterized function you connect the PC's COM Port with the telecontrol equipment following the plan below.

Monitoring wiring diagram



Simulation wiring diagram

With Simulation switched on the program causes a link to be established. When the partner station transmits you should see the received messages.

With the Menu View or the keypad shortcut "1 to 7" you can change the output format of the messages. The current output format is displayed in the heading. WinPP101 saves the current parameters, Log file and messages when you exit from the program.

2.3 Operating Instructions

The usual Windows operations apply for program start, maximising, minimising and closing the program window.

The program WinPP101 uses menus for setting values and operation. You call the on-line Help for any main menu and for the dialogue fields via the key "F1" (e.g. select the menu and press F1).

You can select menus and input fields with the mouse or keypad. Keypad selection takes place via the "Alt" key and a "**Hotkey**". "Hotkey" is the underlined character in the menu text (e.g. "F" in File Menu) or in the label of an input field. Some operating systems display the Hotkey in the menu text only after menu selection (Press the Alt key).

For commonly used commands (On-line, Off-line, Transmit Message) you can enable a "**keypad shortcut**", see **WinPP101 Options**. A "keypad shortcut" is a key combination with which you execute a command directly. For example the key combination "Alt+F1" transmits the first message or "Ctrl+D" deletes the messages in the log file.

Please note that the key Alt activates the Menu selection (a Menu is optically highlighted/raised). If the Menu selection is activated then the shortcuts are **deactivated**. By pressing the Alt key once more you can deactivate the Menu selection again.

If you have selected a table then you are in Navigation mode. Select the desired field with the cursor keys. By a mouse click or by using the key F2 or by pressing "any key" you change to the edit mode. If the "any key" is a valid input then the character entered replaces the previous value. If the input is an invalid key then the current value is retained.

In dialogue windows you can select the next field with the keys "Tab" or "Enter" (Return) or select the previous field with "Shift+Tab". In a drop-down field you can make the list drop down via the key F4 or make a selection with the arrow keys Up/Down or the Spacebar.

In the dialogue windows usually the buttons "OK", "Cancel" and "Help" are displayed. "OK" saves the entered values and ends the input, "Cancel" ends the input **without** saving the values, "Help" calls the on-line Help for the current dialogue field.

You can enter numbers as decimal or hexadecimal numbers, example: 100 or \$64;

2.4 Display Messages

The program displays either the "On-line messages" or the "Log messages". With the Menu **View** you select the messages and the output format. The status bar (lowest line) displays the program status, the kind of displayed message, the status of the filters and the name of the Log file. The kind of message will also be displayed in the message header. The name of the transmitted message file will be displayed in the Title bar. With the **Output filter** you can filter the On-line messages and the Log messages. The meanings of abbreviations can be found in the online help. Faulty messages are marked with an Error text. For the message time a millisecond timer is used which is always synchronised with the PC time at a change from offline to online. For a received message the message time gives the time of reception of the last byte of the message, for a transmitted message the time of starting transmission. With a right click you call the pop up menu.

Display On-line messages

In the window of the "On-line Message Display" you can see the Status Table, the Header and the received and transmitted messages. You can change the message display, see Parameterize | Options | Display online messages.

The Status Table displays the most important parameters from receiver/transmitter 1 and 2, see also **Parameterize Rec/Trans**. The columns have the following meaning:

Text	Description
Received	Displays the number of received and saved messages since selection of on-line status.
Errors	Displays the number of received and saved messages with errors since selection of on-line status.
Transmitted	Displays the number of messages transmitted since selection of on-line status.
Errors	Displays the number of repeatedly transmitted messages since selection of on-line status.
L-Rec	Displays the Link status of the receiver. OK Link status is correct ??? Link status is faulty. - No simulation or COM port is not allocated.
L-Tr	Displays the Link status of the transmitter. OK Link status is correct ??? Link status is faulty. - No simulation or COM port is not allocated.
COM	Displays the parameterized COM port number. - No COM port allocated.
Baud	Displays the parameterized baud rate.
Function	Displays the parameterized function.
Procedure	Displays the parameterized transmission procedure.

The **Header** displays the kind of message, the filter function and the output format. The messages are displayed continuous (scroll mode) or with 7 lines offset, that means also that a maximum of 7 lines are displayed from any one message. The output format "Single line" displays the messages in single lines. The yellow bar indicates the message most recently displayed. If you wish to look at the messages received at your own speed, select "Display Log messages" via F9. The program continues to send/transmit in the background.

Display Log messages

In the "Log Message Display" window will be displayed: the Header, the date and the number of the first message and the number of messages. The output format can be selected via **View**.

With the cursor keys and the scroll bar you can page forwards and backwards. The cursor key Up/Down leafs one message back or forwards. The Page Up/Down keys move five messages backwards or forwards. If you press simultaneously the key Page up/down and the Key Shift, Control or Shift and Control then you move 50, 500 or 5000 messages backwards or forwards. The Home key displays the first (oldest) message. The End key displays the latest (newest) message. If the on-line reception overwrites the messages just being displayed, then the last message received will be displayed the next time that you leaf through the pages.

3 Menus

3.1 File Menu

Use the File Menu to open, save and print the log file or load and save the message file.

Command	Description
Log Delete	Deletes all messages in the current log file.
Log Open or New	Displays the dialogue field Open Log File, with which you can open a log file. If the File does not exist then a new log file will be created. Note: When you start the program several times you must use different Log files.
Log Save as	Displays the dialogue field Save Log file, with which you can save the current log file under a specified name. The old log file will be further used.
Log Print / to text, log file	Displays the dialogue field Print Log messages , with which you can print the messages from a Log file to a printer or save as ASCII text file or save as file in the Log format.
Transmit messages (Settings) Load	Displays the dialogue field "Load transmit messages (Settings)", with which an existing transmit messages file can be loaded. The transmit messages file consists of parameterized transmission messages, transmission lists, command responses and Settings (baud, function, link address ...).
Transmit messages (Settings) Save as	Displays the dialogue field "Save transmit messages (Settings)", with which you can save the current transmission messages, transmission lists, command responses and Settings (baud, function, link address ...).
Object Texts Load	Displays the dialog box "Load object texts file", with which you select and load the desired CSV file, example file see "ExText1.csv".
Exit	Saves the current program status, the current log file, message file and ends the program.

3.1.1 Print Log messages (File | Log Printing)

With this dialogue field you parameterize the message output to a printer or into a text file. Note that the Output filter and the Output format are also apply to the printing.

Message Output

Select the corresponding option for output to a printer, to a text file or to a log file.

Select Printer

This drop-down field displays the available printers. Select the desired printer.

Name of file

Depending on the telegram output, this drop-down list box shows all text or log files (*.txt, *.lg1) existing in the current directory. Enter a new file name or select an existing file and overwrite it. The current log file cannot be overwritten.

Start the print output with "OK".

3.2 Mode Menu

Use the Mode Menu to switch the program between on-line and off-line mode and to call the dialogue field Link Test. "On-line" means that the program uses (opens) the parameterized serial interface and can receive and transmit data. Please also note the status bar.

Command	Description
On-line	The program receives/transmits data over the serial interface.
Off-line	The program releases (closes) the serial interface.
Link Test Rec/Trans 1	Displays the dialogue field Link Test Rec/Trans 1 .
Link Test Rec/Trans 2	Displays the dialogue field Link Test Rec/Trans 2 .

3.3 Transmit Menu

Use the Transmit Menu to carry out the instigation of transmission for messages and lists. The program checks cyclically in the background whether a message or a list should be sent. The interrogation is in the order: message 1-12, list 1-12. The first message or first list found will be sent. After it is sent the interrogation begins again at message 1 that means that message 1 has the highest transmission priority. In the case of the program simulating the Master or Substation then transmission can only take place when the link was established successfully to the partner station. When monitoring you **can always transmit** per operation, the program does not wait for acknowledgement. The command "Stop cyclic transmission" stops the cyclic transmission of messages and of lists.

Command	Description												
Messages	<p>Displays the Messages submenu. Via the relevant Hotkey (1-9, A-C) or by clicking you start the transmission of a message. Between the Hotkey and the list designation there can be a code. The code is dependent on the parameter "Transmission instigated by...".</p> <table border="0" style="margin-left: 20px;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Meaning</th> </tr> </thead> <tbody> <tr> <td>No code</td> <td>Transmission instigated by operation.</td> </tr> <tr> <td>tnn</td> <td>Transmission instigated by Reception of message of type nn.</td> </tr> <tr> <td>lt</td> <td>Transmission instigated by Link Transmitter ok.</td> </tr> <tr> <td>lr</td> <td>Transmission instigated by Link Receiver ok.</td> </tr> <tr> <td>tm</td> <td>Transmission instigated by time.</td> </tr> </tbody> </table>	Code	Meaning	No code	Transmission instigated by operation.	tnn	Transmission instigated by Reception of message of type nn.	lt	Transmission instigated by Link Transmitter ok.	lr	Transmission instigated by Link Receiver ok.	tm	Transmission instigated by time.
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Lists	<p>Displays the transmission list submenu. Via the relevant Hotkey (1-9, A-C) or by clicking you start the transmitting of a list. Between the Hotkey and the list designation there can be a code. The code is dependent on the parameter "Transmission instigated by...", see Messages above.</p>												
Stop cyclic transmission	<p>Stops the cyclic transmission of all messages and lists. The simulation of the link level, the command responses and the command confirmation remain unchanged. The command is only active during cyclic transmission.</p>												

3.4 View Menu

Use the View Menu to format the output and select the type of message (On-line, Log messages). The chosen output format will also be used in printing messages. With **Output filter** you can filter messages.

Commands	Description
With time	The messages will be displayed with or without the time. The messages in the Log file will be given a time stamp when received or sent. The PC system time will be used.
With Link	The messages will be displayed with or without the link. If you have selected "Without Link" then the program stops displaying the link messages. They will however continue to be saved and counted.
Logical	The message type and the transmission cause will be displayed in plain text. Each data messages will be displayed in four lines (without time, without link).
Compact	The message type and the transmission cause will be displayed in a compact form. The texts of the message types are defined in the "Typ1Usa.csv" file. You can modify the texts in the file. Each data messages will be displayed in two lines (without time, without link).
Single line	The data message will be displayed in one line. If the line is too long, select without time, without link or select a different output format. The texts of the message types are defined in the "Typ1Usa.csv" file. You can modify the texts in the file.
Byte ser. Hex.	All bytes of a message will be displayed in hexadecimal. The order is the same as the received order.
Export (CSV)	The message will be displayed in one line. All values are separated with semicolons (";"). Use this format when printing out to a file, if you want to load the messages into a spreadsheet. The values will be output in the following order: Message number, sub-number, message identification, date, time, milliseconds, message type, error text, link code, link address, type text, type number, structure, cause, source, station address, object address, plain text, data, qualifier, milliseconds, minutes, validity id, hour, summer time, day, month, year. The data is type dependent. For time only the values that exist will be displayed. The sub-number numbers the objects or the data within a message.
Log messages	The messages of the log file are displayed. With cursor keys or the scroll bar you can leaf through the pages, see Display messages .
On-line messages	The received and transmitted messages are displayed continuously. The yellow bar marks the latest message displayed, see Display messages .

3.5 Parameterize Menu

Use the Parameterize Menu to parameterize the transmission messages, transmission lists, receiver/transmitter 1 or 2, general parameters and to set options.

Commands	Description												
Messages	<p>Displays the submenu Transmission messages. With the relevant Hotkey (1-9, A-C) or by clicking you call the dialogue field Parameterize message. Between the Hotkey and the list designation there can be a code. The code is dependent on the parameter "Transmission instigated by...".</p> <table border="0"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">meaning</th> </tr> </thead> <tbody> <tr> <td>No code</td> <td>Transmission instigated by Operation.</td> </tr> <tr> <td>ttn</td> <td>Transmission instigated by Reception of message of type nn.</td> </tr> <tr> <td>lt</td> <td>Transmission instigated by Link Transmitter ok.</td> </tr> <tr> <td>lr</td> <td>Transmission instigated by Link Receiver ok.</td> </tr> <tr> <td>tm</td> <td>Transmission instigated by time.</td> </tr> </tbody> </table>	Code	meaning	No code	Transmission instigated by Operation.	ttn	Transmission instigated by Reception of message of type nn.	lt	Transmission instigated by Link Transmitter ok.	lr	Transmission instigated by Link Receiver ok.	tm	Transmission instigated by time.
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Lists	<p>Displays the submenu Transmission Lists. With the relevant Hotkey (1-9, A-C) or by clicking you call the dialogue field parameterize list. Between the Hotkey and the list designation there can be a code. The code is dependent on the parameter "Transmission instigated by...", see Messages above.</p>												
Command responses	<p>Displays the dialogue field Parameterize command response with which you can allocate/classify the command responses.</p>												
Language	<p>Displays the language selection submenu.</p>												
Font size, Message colors	<p>Displays the "Font size, Message colors" dialog window. The font size and the message output colors can be specified via this window.</p>												
Color of the ASDU types	<p>Displays the Color of the ASDU types dialog window.</p>												
Color of the transmission causes	<p>Displays the Color of the transmission causes dialog window.</p>												
Receiver/transmitter 1/2	<p>Displays the dialogue field Parameterize receiver/transmitter, with which you can parameterize the program function, link address, COM number, Baud rate etc.</p>												
General	<p>Displays the dialogue field General parameters, with which you can parameterize the Message and File transfer parameters and the size of the Log file. These parameters are valid for receivers/transmitters 1 and 2.</p>												
Options	<p>Displays the dialogue field WinPP101 Options, with which you activate various functions.</p>												
Dial up modem	<p>Displays the dialogue field Dial up modem, with which you specify and send modem commands (AT commands).</p>												

3.6 Filter Menu

Use the Filter Menu for filtering the message output to the monitor screen and printer and to switch the output filter on or off. With the Log Filter you can filter the messages saved to the Log file.

Commands	Description
Output filter	Displays the dialogue field Parameterize Output Filter , with which you can change the form of the output of messages on the screen.
Output filter off/on	Switches the output filter off or on (if you have parameterized the output filter). You can thus deactivate the filter function without reparameterizing the output filter.
Log filter	Displays the dialogue field Parameterize Log Filter , with which you can parameterize the filter for saving messages to the log file. Note that only the saved messages will be On-line displayed.

3.7 Help Menu

Use the Help Menu to start the On-line Help or to display the program version number.

WinPP101 Help	Starts the On-line Help.
Info	Displays the program version number.

4 Parameters

4.1 General parameters (Parameterize | General)

With this dialogue field you parameterize the message parameters, the file transfer parameters and the size of the Log file. The parameters are valid for receiver/transmitter 1 and 2.

Length of link address

Enter the length of the link address in bytes.

Originator address

The parameter specifies the length of the transmission cause. If the originator address exists then the cause of transmission consists of two bytes, otherwise it has only one byte.

Structure of station address

Here you define the length and structure of the station address in bits. The station address can be 8 or 16 bits long (1 or 2 bytes). If the address is structured then give the length in bits for each field, from high to low, up to 5 fields. The sum must be 8 or 16. The station address is also called "Common address of ASDU" or "Common address".

Example 1: The address is 1 bytes long and unstructured. Enter: 8

Example 2: The address is 2 bytes long and structured, the highest value field is 4 bits long, the least value field is 12 bits long. Enter: 4 12

Structure of object address

Here you define the length and structure of the object address in bits. The object address can be 8, 16 or 24 bits long (1, 2 or 3 bytes). If the address is structured give the length in bits for each field, from high to low, for up to 5 fields. The sum must be 8, 16 or 24. The object address is also called "Address of the information object".

Example 1: The address is two bytes long and unstructured. Enter: 16

Example 2: The address is three bytes long and structured (12 bits field number, 8 bits element number, 4 bits current number). Enter: 12 8 4

Value normalized for 100%

Normalized measured values and set points will be displayed as a decimal number and as a percentage. The percentage value is calculated using the parameterized value.

File addressing by

The parameter specifies for File Transfer Simulation whether the file will be addressed by the file name or by the object address.

Time-out [s]

The parameter specifies the monitoring time for file transfer. The message "File ready" (F_FR_NA_1) starts the monitoring. The message "File confirmation" (F_AF_NA_1) ends the monitoring. During the monitoring, every file transfer message reloads the monitoring time. When the monitoring time runs out, then the file transfer simulation is stopped.

Select first file

If you have parameterized "automatically" then the program sends the message "File select" (F_SC_NA_1) for the first file in the file directory after receiving the message "File directory". The message will be sent after receiving the last directory messages (LFD = 1), at the most 10 seconds later.

Idx file:

The parameter specifies whether the program uses an index file during transmission or creates one when receiving. The index file has the same name as the data file but the extension 'IDX'. The Index file is an ASCII text file in which the section lengths are stored (1-16777215). Every section has a line; each line ends with the control characters carriage return and linefeed (13, 10).

Example: The data file '123' is 13111 bytes long and will be transmitted in four sections with the lengths 12, 12000, 999 and 100.

File name: 123.IDX
Line 1: 12
Line 2: 12000
Line 3: 999
Line 4: 100

Max. size of Log file [MB]

The parameter specifies the size of the Log file in million bytes. There must be enough free space on the hard disk.

Data Directory

The program saves the log file, the transmit telegram file, the csv files of the lists, the command response information, the filter file and the configuration data to the specified directory.

Summer time flag in transm. lists, command responses

If messages with time are transmitted in the transmission lists or with the "Simulation of command responses", this parameter determines whether the "Summer time bit" is set in the message.

Substituted time flag in transm. lists, command responses

If messages with time are transmitted in the transmission lists or with the "Simulation of command responses", this parameter determines whether the "Substituted time bit" is set in the message.

4.2 Font size, Message colors (Parameterize | Font size, Message colors)

In this dialog window, you can specify the font size and the message output colors. The left box displays examples of the selected colors.

Colors are assigned in the following priority:

- Color of the receiver/transmitter (lowest priority)
- Color of the transmission cause
- Color of the ASDU type
- Color of the object address (highest priority).

The assignment of the colors is stored in the "W101.cfg" file.

Font size

Select the desired font size.

Blank lines between the messages in per cent

You may enter values between 0 and 200 %. Zero means no blank line, 200 means two blank lines.

R1 Receiver1

Select the text color and the background color for Receiver1.

T1 Transmitter1

Select the text color and the background color for Transmitter1.

R2 Receiver2

Select the text color and the background color for Receiver2.

T2 Transmitter2

Select the text color and the background color for Transmitter2.

Heading

Select the text color and the background color for the heading. The background color of the message output window is cleared by the background color of the heading.

Error text

Select the text color and the background color for the error and program text messages.

4.3 Color of the ASDU types (Parameterize | Color of the ASDU types)

The message color to be used for an individual ASDU type is specified in this dialog box. Select the type and then select the text color and/or background color. The selected color are displayed as an example in the type list.

Colors are assigned in the following priority:

- Color of the receiver/transmitter (lowest priority)
- Color of the transmission cause
- Color of the ASDU type
- Color of the object address (highest priority).

The assignments "Color per type/transmission cause" are saved in the "W101.cfg" file and in the telegram file (e. g. SeTel.st1).

ASDU types

Select the desired type.

Text color

Select the desired color. The selected color is indicated in the type list.

Background

Select the desired color. The selected color is indicated in the type list.

4.4 Color of the transmission causes (Parameterize | Color of the transmission causes)

The message color to be used for an individual cause of transmission is specified in this dialog box. The cause must be selected first and the text color and/or background color afterwards. The selected color are displayed as example in the cause list.

If a private transmission cause is assigned a specific color, the message concerned is no longer output as an error with the "Transmis. cause false" ID, but as a usual message with the " User cause of transm." ID.

Colors are assigned in the following priority:

- Color of the receiver/transmitter (lowest priority)
- Color of the transmission cause
- Color of the ASDU type
- Color of the object address (highest priority).

The assignment of a specific color for each cause is stored in the "W101.cfg" file.

Causes

Select the desired cause of transmission. The list also indicates causes with the "test" and "negative confirm" IDs.

Text color

Select the desired color. The selected color is indicated in the cause of transmission list.

Background

Select the desired color. The selected color is indicated in the cause of transmission list.

4.5 Parameterize Rec/Trans 1/2 (Parameterize | receiver/transmitter 1/2)

With this dialogue field you parameterize the parameters specific to protocol and interface e.g.: function, COM number, Baud etc.). The dialogue field consists of the following pages.

Page 1 Here you find the parameters specific to the protocol.

Page 2 Here you find the parameters specific to the interface.

With the keys "Ctrl+Tab" you can toggle between the pages.

Page 1

Function

With this parameter you specify the program function. The selected function is only possible in on-line Mode, see **Mode**.

Monitoring: You can monitor messages on an existing link. The received messages are checked for logical correctness. If your PC has two COM interfaces, you can monitor the command and monitoring directions simultaneously. You only use the receiver of COM interface. The program does not send any messages itself. **You can transmit messages via operation.**

Master/Substation (balanced): In mode On-line the program establishes a link to the partner station. Messages received are acknowledged and possibly cause the transmission of messages or message lists. You can send messages or lists. The program waits for and checks the acknowledgement.

Master (unbalanced): In mode On-line the program establishes a link to the substation and sends cyclic polling messages. You can send messages/lists. The data messages will be inserted into the polling cycle.

Substation (unbalanced): In mode On-line the received messages with 'correct' link address are processed logically. Polling messages are acknowledged with 'Interrogated data not available'. If a message or a transmission list is active then the data message will be sent. A message or a list is activated via an operation or through an event, see **Parameterize message**.

Format 1.2: This function is useful for receiving messages which are framed according to IEC 60870-5-1, Format 1.2, but whose user data do not comply with IEC 60870-5-101. The program does not check the link layer or the user data. Messages with fix or variable length and the single characters E5 and A2 are permissible. The bytes of the messages are displayed as decimal values (Logical), as bit pattern (Compact), as hexadecimal values one-line (Single line) or as hexadecimal values (Byte ser. Hex). Only a few 101 parameters are effective. The parity, the number of data bits per byte and the number of stop bits can be parameterised. The "Length of Link Address" parameter determines the length of the link messages.

Byte receiver: The program receives and transmits byte sequences. All "IEC -101" parameters are irrelevant. The parity, number of data bits per byte and the number of stop bits are to be parameterised. The output format is the same as "Format 1.2". The maximum length or a pause longer than "Idle end of receive message:..." ends the receive message. You parameterise the maximum length and the Idle of the receive message on page 2. If the program does not recognise short pauses, set receive buffer and transmit buffer to 1 or switch off the use of the "FIFO buffer" via the Device Manager, see below „Leading time RTS“.

Monitor RP570: The program expects ABB RP570 telegrams and outputs them logically.

Monitor RP571: The program expects ABB RP571 telegrams and outputs them logically.

Transmission mode

Balanced means spontaneous operation (End-End), unbalanced means polling operation (Polling, Multipoint partyline).

Link address

If link addresses are used (i.e. the length of the link address is greater than zero, see General Parameters), you can parameterize one or several link addresses. The link address will be checked during transmission and reception but not by monitoring. In balanced operation (End-End) only one link address is sensible. In unbalanced operation (polling operation) you can define up to 8 addresses. If the program is simulating the Master then it calls the parameterized addresses one after the other. If the program is simulating the Substation, then it processes the received messages only on address identity.

Cycle time link test

This parameter specifies the cycle time with which the message "Test link status" will be sent. Zero means, "Send no cycle test". Each acknowledgement received without errors resets the cycle time clock, i.e. the message will only be sent if no acknowledgement is received within the cycle time.

Cycle time Polling

In the unbalanced mode, the parameter determines the cycle time of the substation call. If you set the parameter to zero, the call is executed as soon as possible.

Direction bit

The parameterized value will be used in balanced operation during transmission. In unbalanced operation this parameter has no meaning.

Use of single character E5

With this parameter you define whether the single character "E5" is allowed as positive acknowledgement. You can set it to be used with Receive and Transmit (Rec+Trans) or only for Receive (only Rec). The selection "Pos. Ack. + no data" is only sensible in unbalanced operation and means: Use "E5" as positive acknowledgement, and accept and send "E5" in the place of the link message 9 (Interrogated data not available).

Type of cyclic RTU polling

Only possible in unbalanced operation and during simulation of the Master station. The parameter specifies whether the data class 2 (Standard) or 1 will be polled during cyclic RTU polling.

Command messages

The parameter specifies whether the program automatically confirms command messages with the transmission cause "Activation". Command messages are: Commands, General interrogation, Check/Test command, Parameter, etc. (all "CON" messages).

Spikes before/after the message

The parameter determines if spike telegrams shall be displayed and stored. For half-duplex connections or during line operation, pulses may occur on the receive side while the modulation is switched ON and OFF. These pulses are received as bytes. A spike message occurs if the message id faulty, if the message length is smaller than five bytes and if maximally two spike messages occur after an error-free message.

Display changes of: DCD DSR CTS

If desired the program stores the changes in level of the lines together with the time, in the log file. The time measured is most exact when you have not parameterised a transmission delay i.e. "Delay in transmitting: 0" and "Function RTS Signal: always 1 or 0". The lines are assigned to the following pins on the 9-pole COM plug:

Pin	Line	Meaning
1	DCD	Data Carrier Detect
6	DSR	Data Set Ready
8	CTS	Clear To Send

Page 2**Log file comment**

Upon each offline/online change, the program writes this text into the log file.

COM Port for Rec/Trans

The parameter specifies which COM port should be used. At the start of the program the program determines the existing COM ports. The COM port used must not be in use by another program.

Using WinPP101 in a terminal server client session new USB COM ports are only available after restarting your client session.

Baud, Parity, Data

These parameters specify the transmission rate, the parity, the number of data bits per byte and the number of stop bits. Conforming to the IEC 870-5-101 standard, the program sets the byte parity to even, sets the number of data bits to 8 and the number of stop bits to 1. If you have parameterized "**Byte receiver**" for the function or if you activate with the menu "Parameterize | Options | Parity... parameterizable", you can determine the parity, data bits and stop bits.

Max. length of transmitted message

When transmitting a transmission list, several objects are sent in one message if possible (up to the maximum message length). This parameter only exists when the "**Function: ...**" (see page 1) is not equal to Byte receiver.

Max. Length of Receive Message

This parameter only exists when you have parameterised "**Function: Byte receiver**" (see page 1).

Wait time for acknowledgement

This parameter specifies how long the program waits for the acknowledgement. The wait time is dependent on the baud rate and the maximum message length. The program recommends the standard value. You can change the recommended value. This parameter only exists when the "**Function: ...**" (see page 1) is not equal to Byte receiver.

Idle end of Receive Message

An idle time greater than parameterised ended the receive message. This parameter only exists when you have parameterised "**Function: Byte receiver**" (see page 1).

Number of transmission repetitions

If the acknowledgement does not arrive within the "Wait time for acknowledgement" then the program repeats the transmission n times (n equals the parameter value). At the end of the transmission repetitions, the program throws the transmitted message away, reports the transmitter direction as being faulty and sends the "Interrogation Link status" cyclically.

Cycle time of link status interrogation

This parameter specifies the cycle time with which the link status of the partner station will be interrogated in the case of a faulty line.

Transmission delay by

Normally this parameter is zero. A value greater than zero delays the transmission of all messages. So you can delay the reply time. In semi-duplex mode you can wait till the partner station releases the modem.

Function RTS Signal

Necessary for semi-duplex (two wire) or multipoint-party line mode operation. RTS (request to send) informs the modem of the wish to transmit. For duplex operation set the parameter to "always 0" or "always 1".

Leading time RTS

Necessary for semi-duplex or multipoint-party line mode operation. Only possible if you have parameterized "Function RTS Signal: 0/1 during transmission". The leading time will be specified by the initial transient behaviour of the transmission route. The parameter specifies how long the program waits till it starts the transmission after the switching on of RTS. For duplex operation set the parameter to zero. Be warned that the **times are not precise** (within ± 50 ms). **Note:** If the baud rate is less than 9600 you can improve this precision by setting the receive buffer and the transmit buffer to 1 of the FIFO or by switching of the use of the FIFO buffer for the COM port. You parameterize the use of the FIFO buffer as follows: **Start | Settings | Control Panel | System | (Hardware Profile (NT)) | Device manager | COM n | Properties | Interface Settings | Advanced | Use FIFO**. Sometimes the system must be restarted for this change to take effect.

Trailing time RTS

Necessary for semi-duplex or multipoint-party line mode operation. Only possible if you have parameterized "Function RTS-Signal: 0/1 during transmission". The trailing time will be specified by the final transient behaviour of the transmissions route. The parameter specifies how long the program waits after transmission till it switches RTS off again, see also "Leading time RTS". Necessary for semi-duplex or multipoint-party line mode operation. Only possible if you have parameterized "Function RTS-Signal: 0/1 during transmission". The trailing time will be specified by the final transient behaviour of the transmissions route. The parameter specifies how long the program waits after transmission till it switches RTS off again, see also leading time RTS.

4.6 Parameterize message (Parameterize | messages | 1-9, A-C)

Key combinations (if parameterized): "Shift+F1-12"

With this dialogue field you parameterize messages that you want to send. The transmission instigation takes places via operation or an event (e.g.: links establishment or receipt of a message). A click on "Transmission" saves and sends the list without closing the dialogue field. The parameter "Message send how often..." is also valid here.

Right-click outside the input field to call up a pop-up menu. In the pop-up menu, you can save the message in a csv file or load it from a csv file.

Note: You can leave this dialogue field during parameterizing. But you can't open this Dialogue field twice simultaneously.

Message designation

You can allocate a logical designation to the message. This designation will be displayed in the Message Menu.

Transmission instigated by

You can choose whether the message can only transmitted by an operator entry or also by an event. An event can be: Receipt of a specific message (the message type can be parameterized), Link establishment in transmission or reception direction or a time (the minute can be parameterized). On "Transmission instigation by Type n" the received common address must be equal the parameterized common address.

Type n

If the transmission should be "Transmission instigated by: type n" enter the type number here. In all other cases, this parameter has no meaning. The fictive type 256 means instigate by any type, the fictive types 257-272 means instigate by a link message with function code 0-15. The instigation by type 256-272 also runs in monitoring mode and in Byte receiver mode.

Minute

If the transmission should be "Transmission instigated by: Time" specify the minute or the cycle time in minutes.

Msg. to be sent how often

This parameter specifies how often the message is to be sent after a transmission instigation. The value zero means cyclic transmission.

Transmitter

With this parameter you specify which transmitter the message will be sent by.

Wait time after transmission

The parameter specifies for multiple transmissions, how long the pauses are between the messages.

Example: You want to transmit the message 10 times at intervals of 2 seconds.

Parameterize: "message send how often: 10" and "Wait time after transmission: 2000".

Transmission procedure

In the transmission mode balanced or on simulation master unbalanced the following procedures are possible: "Send/Confirm" (the receiving station must confirm the message) or "Send/No Reply" (the receiving station does not confirm the message).

Data class

During the simulation of the substation in the unbalanced mode, you can specify if the message belongs to data class 1 or 2. Data class 1 or 2 is requested with the message "request user data class 1 or 2".

Link address

This parameter only exists when the transmission procedure is unbalanced and you have parameterized more than one link address in **Receiver/transmitter parameterize**. In all other cases, the program automatically uses the first parameterized link address.

Type

For standard messages select an IEC message type. For private messages or for illogical messages select "ASDU as Hex-String", "Link as Hex-String", "Link and ASDU as Hex-String" or "Message as Hex String". For "ASDU or Link as Hex String" the program packs the sequence of bytes to conform to the standard (Start character, length, test character and stop character). By "message as Hex String" the program sends the sequence of bytes unchanged. You can thus simulate faulty messages; see **Simulate faults**. If an IEC type was parameterized before selection of "... as Hex String" then this message will be output as a template. You can then change individual bytes in order to transmit faulty messages. With **"Message as dialup string (ASCII)"**, you can specify modem commands, also refer to Receiver/transmitter parameterize.

Cause

The causes are Type dependent. Only the causes allowed are available for selection.

Originator address

Only exists when you have parameterized the originator address as exist in the dialogue field **General parameters**.

Station address

You can enter the address in decimal or hexadecimal, Example: 123 or \$7b. If the Station address is structured separate the individual values with blank or minus characters, Example: 12 3 or \$c 3 or 12-3.

Object address

You can enter the address in decimal or hexadecimal, Example: 123 or \$7b If the Object address is structured separate the individual values with blank or minus characters, Example: 12 3 or \$c 3 or 12-3.

1 Information status

The parameter text and value are Type dependent, see status bar (last line in window). If you enter a hex string then the following characters are allowed: 0-9, A-F and blanks. Each byte consists of a maximum of two characters. The bytes can be separated by blanks. Example: The input: 1 2 0 78abc results in 6 bytes with the values: 01 02 00 78 ab 0c.

2 Qualifier

The qualifiers are Type dependent, it can be that none exist for a particular type.

3 Time (hh.mm.ss, Millisecond) IV Gen

The time is type dependent. It can be that no time field exists for a particular type. For types with short time (minutes, seconds, millisecs) the hour field is not used. If you do not parameterize time then the current PC system time will be used at transmission.

IV (Invalid) = 0 = time is valid, IV = 1 = time is invalid

Gen (Genuine) = 0 genuine time, Gen = 1 = substituted time.

4 Date

The date is type dependent. It can be that none exists for a particular type. If you do not parameterize date then the current PC system date will be used at transmission.

4.7 Parameterize Lists (Parameterize | lists | 1-9, A-C)

Key combinations (if parameterized): "Strg+Shift+F1-12"

With this dialogue field you parameterize message lists that you wish to transmit. The transmission instigation takes places via operation or an event (e.g.: links establishment or receipt of a message). A click on "Transmission" saves and sends the list without closing the dialogue field. The parameter "List/objects send how often..." and "Number of objects per transmission..." are also valid here. The transmission **begins with the active object** in the list. Afterwards the active object is pushed back the number of places equal to "number of objects per transmission...".

You can copy objects in a list into the Clipboard or cut and paste from the Clipboard. Here select the spreadsheet/table and use the right hand mouse button pop-up menu or with Shift+F10. Before copying/cutting you must select the objects (you can use Shift+cursor keys or Shift+mouse click), at least two fields must be marked.

Note: You can leave this dialogue field during parameterizing. But you can't open this Dialogue field twice simultaneously.

Designation

You can allocate a logical designation to the message. This designation will be displayed in the Lists Menu.

Transmission instigation by

You can choose whether the message can only transmitted by an operator entry or also by an event. An event can be: Receipt of a specific message (the message type can be parameterized), link establishment in transmission or reception direction or a time (the minute can be parameterized). On "Transmission instigation by Type n" the received common address must be equal the parameterized common address.

Type n

If the transmission should be "Transmission instigated by: type n" enter the type number here. In all other cases, this parameter has no meaning. The fictive type 256 means instigate by any type, the fictive types 257-272 means instigate by a link message with function code 0-15. The instigation by type 256-272 also runs in monitoring mode and in Byte receiver mode.

Minute

If the transmission should be "Transmission instigated by: Time" specify the minute or the cycle time in minutes.

List/objects send how often

This parameter specifies how often the list or the **number objects per Transmission** is to be sent after a transmission instigation. The value zero means cyclic transmission.

Number objects per transmission

The parameter specifies how many objects will be sent after a Transmission instigated. The value zero means all objects in the list. The objects will be transmitted in one or more messages without any wait time.

Wait time after transmission

The parameter specifies the transmission cycle time for multiple transmissions. After transmitting the **number objects per transmission** the program waits the specified time till it transmits again.

Example 1: You wish to transmit ten commands at intervals of 5 seconds.

You parameterize:

**list/objects send how often: 10,
number of objects per transmission: 1,
Wait time after transmission: 5000
and ten commands in a list.**

Start via **Transmission| lists | 1-9, A-C**. If you want to start each command per operation then parameterize as follows:

list/objects send how often: 1, all other parameter remain unchanged.

The parameter **Wait time after Transmission** is meaningless here because there is only one transmission per instigation.

Example 2: If you want to transmit 5 objects after receipt of a general interrogation.

Then parameterize:

**Transmission instigated by : Operation./type n
type n: 100
list/objects send how often: 1
number of objects per transmission: 0**

and in the object table:

**the confirmation of the activation
the five objects and
the stopping of the activation.**

Transmission procedure

In the transmission mode balanced or on simulation master unbalanced the following procedures are possible: "Send/Confirm" (the receiving station must confirm the message) or "Send/No Reply" (the receiving station does not confirm the message).

Data class

During the simulation of the substation in the unbalanced mode, you can specify if the message belongs to data class 1 or 2. Data class 1 or 2 is requested with the message "request user data class 1 or 2".

Link address

This parameter only exists when the transmission mode is unbalanced and you have parameterized more than one link address in **Parameterize receiver/transmitter**. In all other cases, the program automatically uses the first parameterized link address.

Originator address

Only exists if you parameterized the originator address as exists in the dialogue field

General parameters.

Station address

You can enter the address in decimal or hexadecimal, Example: 123 or \$7b. If the Station address is structured separate the individual values with blank or minus characters, Example: 12 3 or \$c 3 or 12-3.

Parameterize the object table

After selection of the spreadsheet/table (with mouse click or Tab key) you will find yourself in Navigation mode. With the cursor keys you can select a particular field. By clicking or use of the function key F2 or any key you return to edit mode. Any valid key overwrites the old value, an invalid key retains the old value. With Enter or Tab you leave the input field. You can copy the objects in a list with pop-up menu or the keypad combinations into the Clipboard, cut and paste from the Clipboard. Before copying/cutting you must select the objects (you can use Shift+cursor keys or Shift+mouse click), at least two fields must be marked. The program always copies complete objects.

Example 1: You have parameterized 5 objects (1-5) and want to copy the objects 3-5 to object 6-8.

Select the active column of object 3. Hold the shift-key down and press the down arrow key twice (The active column of object 3, 4 and 5 is marked). Press the right hand mouse button to call the pop-up menu. Select Copy. Then select with the cursor keys the active column of object 6. With the command Insert from the pop-up Menu insert the three objects at object 6.

Example 2: You want to delete object 5.

Select the active column of object 5. Hold the shift-key down and press the Right arrow key once the (Active and object address are marked). Release the shift key. Using "Ctrl+X" delete the object 5. The following objects will be moved upwards. The deleted object has been put into the Clipboard

Active

Only the marked objects will be transmitted.

Object address

You can enter the address in decimal or hexadecimal, Example: 123 or \$7b. If the object address is structured separate the individual values with blank or minus characters, Example: 12 3 or \$c 3 or 12-3. With a right click you invoke a selection list.

The width of the column can be modified. Drag the left side of the window to the left or to the right with the mouse.

Type

Input a valid type number or press the function key F12 or right click for the selection list.

Cause

Input a valid cause number or press the function key F12 or right click for the selection list. The cause is type dependent. Only the causes allowed are available for selection.

Information

The information is type dependent. Enter the desired value as a decimal number, hexadecimal number (\$nn) or as bit string (.I). Note the status bar with the valid ranges.

Qualifier

The qualifier is type dependent. Enter the desired value as a decimal number, hexadecimal number (\$nn) or as bit string (.I). Note the status bar with the valid ranges.

4.8 Parameterize Command Responses (Parameterize | Command responses)

With this dialogue field you activate and parameterize the command responses. The message types 45 to 51 are commands.

You can copy objects of the table into the Clipboard or cut and paste from the Clipboard. Here select the spreadsheet/table and use the right hand mouse button pop-up menu or with Shift+F10. Before copying/cutting you must select the objects (you can use Shift+cursor keys or Shift+mouse click), at least two fields must be marked.

Simulation of command responses

With this parameter you switch the simulation on and off. When simulation is switched on the program searches for the station and the object address of the received command in the spreadsheet/table. If the program finds the addresses then it sends the parameterized reply messages. If the program does not find the addresses then it sends the 'Negative confirmation of activation'. The program searches through the whole spreadsheet/table. You can also parameterize the same address several times (several responses after sending a command).

The functions "Simulation command responses" and "Command messages: Confirm" or "Transmission instigated by type n" can be active simultaneously.

Parameterize the spreadsheet/table

After selection of the spreadsheet/table (via click or Tab key) you find yourself in Navigation mode. With the cursor keys you can select any field. By clicking or via the function key F2 or any key you enter the edit mode. A valid key overwrites the old values, an invalid key not. Via the Enter or Tab key you leave the input field.

Station

Specify the station address which should be replied to. The station address will also be for the response.

Object address

Specify the object address which should be replied to.

Con

If this parameter is marked then the 'Confirm the activation' will be sent (Con = Confirmation).

Ret

If this parameter is marked then the parameterized command response will be sent (Ret = return information = Response). This parameter is meaningless for selection commands.

Term

If this parameter is marked then the 'Stop the activation' will be sent (Term = Termination). The parameter is meaningless for selection commands.

R object address

This parameter specifies the object address of the command response.

R type

This parameter specifies the message type of the command response. Only the types 1-14 and 30-36 are allowed. If the response type matches the command type (single, double message single, double command or measured value standardised to target value standardised, etc.), then the received information will be send back, otherwise the information section equals zero.

4.9 WinPP101 Options (Parameterize | Options)

With this dialogue field you enable the key combinations and allow the Link Test.

Use 'F8' to toggle between On-line/Off-line

Here enable the function key F8.

Use 'F9 or Cursor up/Esc' to toggle Log/Online Display

Here enable the function key F9.

Use 'F11' to switch Output filter off and on

Here enable the function key F11. Only if you have parameterized the Output filter, you can switch the Filter off and on.

Use 'F12' to call up Output filter

Here enable the function key F12. You can then use F12 to start the dialogue field Parameterize Output filter.

Use 'Shift+Fn' to parameterize message n

Here enable the key combination Shift+Fn (n = 1-12). You can then use Shift+Fn to start the dialogue field Parameterize message n.

Use 'Alt+Fn' to transmit message n

Here enable the key combination Alt+Fn (n = 1-12). You can then use Alt+Fn to transmit the message n.

Use 'Strg+Shift+Fn' to parameterize list n

Here enable the key combination Ctrl+Shift+Fn (n = 1-12). You can then use Ctrl+Shift+Fn to start the dialogue field Parameterize list n.

Use 'Strg+Fn' to transmit list n

Here enable the key combination Ctrl+Fn (n = 1-12). You can then use Strg+Fn to transmit the list n.

Link Test allowed

Here allow the Link Test. You can then use the menu Mode to start the dialogue field Link Test.

Parity, number of data bits parameterizable

Here enable the function "Parity, number of data bits parameterizable" for the COM port. That's useful for connections which don't use a parity.

Display online messages in scroll mode

In scroll mode the newest message is always at the bottom of the page.

Increase integrated totals by 15, sequence no by 1

On request, the program increases the integrated totals by 15 before the transmission (message type 15, 16 and 37). The sequence number is increased by one.

Cyclic transmission of an external telegram, loading ext. lists, cmd. responses.

This option activates a function for the transfer of telegrams, lists and command responses to WinPP101 via an external program. If the option has been activated, the program performs the following check once per second during online operation:

- Ø If the "ExtTele1.csv" file exists in the "Data Directory" and if the file includes a valid telegram, then the telegram is sent. The file length is set to zero in any case.
- Ø If the "ExtList1.csv" file exists in the "Data Directory" and if the file includes a valid list, then the file is loaded to List12. The file length is set to zero in any case.
- Ø If the "ExtCmdRsp1.csv" file exists in the "Data Directory" and if the file is valid, then the file is loaded to the command responses. The file length is set to zero in any case.

The file structure complies with the format which is used for saving a telegram, a list, a command responses to a csv file (right-click in the parameter setting window).

Using a new log file every day, name: LogTT.lg1

When activating the option, a new log file will be created for each day of a month. The number of the day (01 - 31) is indicated in the file name. The files of the previous month will be overwritten in the following month.

4.10 Dial up modem (Parameterize | Dial up modem)

Use this dialog box to specify and send modem commands (AT commands).

To call up the context menu, click with the right mouse button outside the input box. Using the related context menu items, you can save the modem parameters to a file or load them from a file.

Dial-up modem available on Receiver/Transmitter 1

Tick the corresponding checkbox in order to specify that a dial-up modem is connected to the COM port of Receiver/Transmitter 1. If a modem exists, the program waits for the connection message (connect) from the modem. During the delay time, you specify and send modem commands. The link is set up as soon as the connection message has been received.

Program status

This box shows the program status.

DCD status

Indicates the status of the 'Data Carrier Detect' modem signal

Modem commands

Specify the parameters of modem commands in these four input boxes. To send the command, click the related "Send" button.

Break the connection

In this input box, enter the modem command for breaking a connection. Click the related "Send" button in order to send the command. Before sending the command, the processing of the link is interrupted for two seconds.

Max. time of a phone connection

The time is measured from the receipt of the connection message. As soon as the specified time has expired, the program automatically sends the "Cut connection" modem command. Afterwards, the program waits again for a new connection message.

Receive telegram time out

An error-free telegram must be received within the specified time period. The connection is cut as soon as this time has expired. Time measuring starts upon receipt of the connection message.

Connection message

Enter the message for which the program has to wait. The link is set up as soon as the program receives the message. Afterwards, it sends and receives 101 telegrams.

OK

Clicking this button saves the current parameters and closes the modem window.

Toggle DTR

Click this button to toggle the "Data Terminal Ready" modem signal. In this context, toggling means: Invert the DTR signal, wait two seconds, invert the DTR signal. Afterwards, the program waits for the connection message.

5 Filters

5.1 Parameterize Output filter (Filter | Output filter)

Key combination (if parameterized): "F12"

With this dialogue field you parameterize the output filter. The output filter filters messages from the Log file for output to screen, printer or text file. The filter is active if you have parameterized at least one filter and not switched off the output filter, see **Filter**. An active output filter can be seen from the note in the Status bar and from the word "Filtered" in the header of the message output. All parameterized filter are linked with "and", i.e. all conditions must be met for the message to be output.

You can save the filter settings to a file or load them from a file by clicking with the right mouse button.

Messages from

If marked then only those messages will be displayed whose time is after the parameterized time.

Messages until

If marked then only those messages will be displayed whose time is before the parameterized time.

Message status

With this parameter you select only correct or only faulty messages. If you mark both or no field then the Filter is off.

Message source

With this parameter you select messages from one receiver or transmitter. If you mark both or no field then the filter is off.

Message number

The messages in the log file are numbered (1-n). With this Filter you can select a section/range or one or two specific message numbers.

Example: In the log file there are 1000 messages.

1) You want to display the message 500.

Enter: message number equals 500 off nn (nn = any number)

2) You want to display the messages 500 and 600.

Enter: message number equals 500 or 600

3) You want to display all messages apart from 500 and 600.

Enter: message number unequal to 500 or 600

4) You want to display the messages 500 to 600.

Enter: message number equals 500 to 600

5) You want to display the messages 1-499 and 601-1000.

Enter: message number unequal to 500 to 600

Message length

Parameterize one or two length or a range.

Link code

Parameterize one or two Codes or a range.

Link address

Parameterize one or two addresses or a range. This filter only exists if the link address exists.

Message type

Parameterize one or two types or a range.

Cause

Parameterize one or two Causes or a range.

Originator address

Parameterize one or two addresses or a range. This filter is only available if the originator address exists.

Station address

Parameterize one or two addresses or a range. If the station address is structured then there is a filter for each field. The highest value field will be designated the station address 1.

Object address

Parameterize one or two addresses or a range. If the object address is structured then there is a filter for each field. The highest value field will be designated the object address 1.

5.2 Parameterize Log Filter (Filter | Log filter)

With this dialogue field you parameterize the Log filter. The Log filter filters messages out of the received or transmitted messages for the storing in the Log file. The filter is active if you have parameterized at least one filter. You can see if a Log filter is active from a reference in the status bar. The parameterizing and the filter logic is the same as for the output filter, see **Parameterize Output filter**.

The filters for Time and for Message Number are particularly useful in Log Filter.

With the Time filter you can specify a time range in which the messages will be stored. For example: from 9.08.2000 22:00 to 10.08.2000 4:00.

With the filter of Message Number you can limit the number the stored messages. For example: "Message number equals 1 to 10000". If the log file is empty then you must parameterize from message number 1. If the log file is not empty then the "Message number to" must be greater than the number of messages in the log file.

The log file is organised as a circular buffer. If the file is full then the newest message overwrites the oldest message. You can prevent this by deleting the old messages before the test start (Ctrl+D) or increase the maximum size of the log file or filter the messages by time or/and by message number.

Note that only the stored messages will be displayed during On-line output. The message counter in the Status table counts all messages.

6 Faults Simulation

6.1 Faults Simulation

For test and check purposes it can be sensible to transmit faulty messages or to react incorrectly to correct messages.

A message can be faulty in a variety of ways. The fault can be in the transmission layer, link layer or application layer.

Faults in the transmission layer are e.g. parity or frame faults in bytes. They can occur through a false/ incorrectly parameterized baud rate.

Faults in the link layer are e.g. false/incorrect start bytes, stop bytes, check bytes, length bytes, link code or link address. A part of the fault can occur if you have parameterized the length link address incorrectly.

Faults in the application layer are e.g. station or object address false/ incorrect, type, cause unknown, message length, structure identifier illogical, invalid cause to a specific type. A part of the fault can occur if you have intentionally (or unintentionally) parameterized the length of the station address, object address, originator address (Cause) falsely/ incorrectly.

For specific fault simulation use the dialogue fields **Link Test Rec/Trans** and **Parameterize message**. The dialogue field Link Test influences the **Link messages** considerably and the **Simulation File Transfer**. Use the dialogue field Parameterize Message in the normal case to parameterize **Data messages**. However at the end of the type table you will find the two fictional types "ASDU as Hex String" and "Message as Hex String". With these types you can simulate a variety of faults.

"ASDU as Hex String" means: You parameterize only the ASDU (from Type), the correct message packaging is inserted by the program. You can thus transmit private ASDUs or a standard ASDU modified intentionally without having to bother oneself with the check section or the link part. For example, you can modify the type, the cause, the structure, qualifier and time to any values you want. You can also insert bytes to make the ASDU length illogical.

"Message as Hex String" is ever more flexible. Here you can transmit whatever you want. You can send the messages with false/ incorrect link code, start bytes, length bytes, stop bytes, check bytes, etc. If you have parameterized a standard message before selection of the type "Message as Hex String" then this standard message will be output as a hex String. You can then modify it as desired and do not need to parameterize all the bytes.

In order to simulate faults it can be sensible to switch off the simulation. The program does not establish a link connection, does not acknowledge the messages automatically, does not wait for acknowledgement and only sends after an operation. If you have parameterized the link messages "Normieren Link" and "Single character E5" as hex String, you can establish the link per operation and acknowledge received messages. Use several messages to send false and correct messages one after another. Multiple transmissions are also possible.

6.2 Link Test Rec/Trans 1/2 (Mode | Link test Rec/Tr. 1/2)

With this dialogue field you can change the simulation of the link level, the file transfers and the ASDUs. On leaving the dialogue field the program resets all options (nNormal status). You can only call this dialogue field if you have enabled it to be used, see **WinPP101 Options**.

Send NACK instead of ACK;

If marked the every received message will be acknowledged with NACK.

Send DIR bits false;

If marked then the program sends the direction bits inverted.

Send PRM bits false;

If marked then the program sends the primary bits inverted.

Do not toggle FCB bits;

If marked then the program does not toggle the frame count bit.

Send FCV bits false/ incorrect;

If marked then the program sends the frame count valid bits inverted.

Send ACD bits equal to 1;

If marked then the program sets the access demand bits in the secondary messages. In balanced operation the reserved bits will be set.

Send DFC bits equal to 1;

If marked then the program sets the data flow control bits in the secondary messages.

Send no ASDUs;

If marked then the program sends no more data messages (ASDUs). However the Link layer will continue to be simulated.

Send/Acknowledge file transfer CHS incorrectly;

This parameter is connected to Simulation File Transfer. If marked the program always interprets a received checksum byte as false. If the program sends a checksum byte then it adds a 1 to the correct value.

Send File transfer SCQ = deactivate;

This parameter is connected to the Simulation File Transfer. If marked the program acknowledges the message "Section ready" (F_SR_NA_1) with "Section abort". The partner station should then offer the next section.

7 Simulation File Transfer

The program can transmit and receive files. The following text is easier to understand if you know the addendum A1 to IEC 870-5-101. For the simulation the following rules apply:

The program looks in the current directory for file names that are numerical and without extension and stores them. If you have parameterized "File addressing with object addr = DIN40952" then the program also looks for numeric subdirectories (SubD).

The search takes place at program start and after leaving the dialogue field **General Parameters** with "OK". The program searches for a maximum of four directories and a maximum of five files per directory.

When you parameterize a file directory message (FDMsg, type=126) then the program enters the directories and files. The parameterized FDMsg will be sent after reception of the message 'F_SC_NA_1'.

You must make the files and the subdirectories before the program start with Explorer or in a DOS-Box with the DOS commands 'mkdir' and 'copy'.

Then the following functions are available for the simulation of file transfer:

- The file directory messages (FDMsg) can be parameterized (only type, cause, stations and object address (OA), the program enters the files and directories found). The OA is **not** permitted to be **equal** to the numerical sub-directory names.
- Transmit a FDMsg following an operation or automatically after reception of F_SC_NA_1 with OA equal to Null.
- The subdirectory messages (SubDMsg) can be parameterized, the OA must be **equal** to a subdirectory name, if the OA is unknown (unequal to any subirectory) then the program displays the values of FDMsg.
- Transmit an SubDMsg following an operation or after reception of F_SC_NA_1 or automatically after File transfer.

You must parameterize the FDMsg for the simulation. You can parameterize SubDMsgs if you want to transmit SubDMsg's per operation. The automatic transmission takes place with the data generated by the program. If you parameterize a SubDMsg then the message number must be greater than the message number of the FDMsg.

For the FDMsg the program searches in the current directory for all subdirectories and files whose names are numeric (1-65535) and enters them in FDMsg. If the SubD has an extension it must be numeric (0-9). The extension will be entered in the FDMsg as a name. Files are not allowed to have an extension.

For the SubDMsg the program searches in the subdirectories found for all files whose names are numeric and have no extension.

After a file transfer the SubDMsg will be updated and automatically transmitted. In the FDMsg the associated time will also be updated. The file transmitted will not be deleted from the hard disk. When all the files have been transmitted then the SubDMsg will be empty.

The existing files will be re-entered in the SubDMsg if you parameterize the SubDMsg and set the OA first to an invalid value and afterwards to a valid value.

The parameterized object address (OA) of the FDMsg specifies the OA of the SubDs. The directory names specify the OA of the files in the SubDMsg.

Example:

Assuming that the following directories and files have been made in the current directory before the program is started and they were found by the program in the order as shown.

Directory	Commentary
2000.2	DOS Name Subdirectory 1
2000.2\12345	File 1
2000.2\12400	File 2
2000.2\63210	File 3
2000.2\123	File 4
3000.2	DOS Name Subdirectory 2
3000.2\123	File 1
3000.2\7890	File 2
3000.2\63210	File 3
2500.2	DOS Name Subdirectory 3
2500.2\123	File 1
2500.2\124	File 2

When you have parameterized the FDMsg with the Object Address 1000 it results in the following assignment.

Object address	Object
1000	SubDMsg of subdirectory 1 = 2000
1001	SubDMsg of subdirectory 2 = 3000
1002	SubDMsg of subdirectory 3 = 2500
2000	File 1 in subdirectory 1, Name 12345
2001	File 2 in subdirectory 1, Name 12400
2002	File 3 in subdirectory 1, Name 63210
2003	File 4 in subdirectory 1, Name 123
3000	File 1 in subdirectory 2, Name 123
3001	File 2 in subdirectory 2, Name 7890
3002	File 3 in subdirectory 2, Name 63210
2500	File 1 in subdirectory 3, Name 123
2501	File 2 in subdirectory 3, Name 124

Please note that you request the SubDMsgs with the OA from the FDMsg.