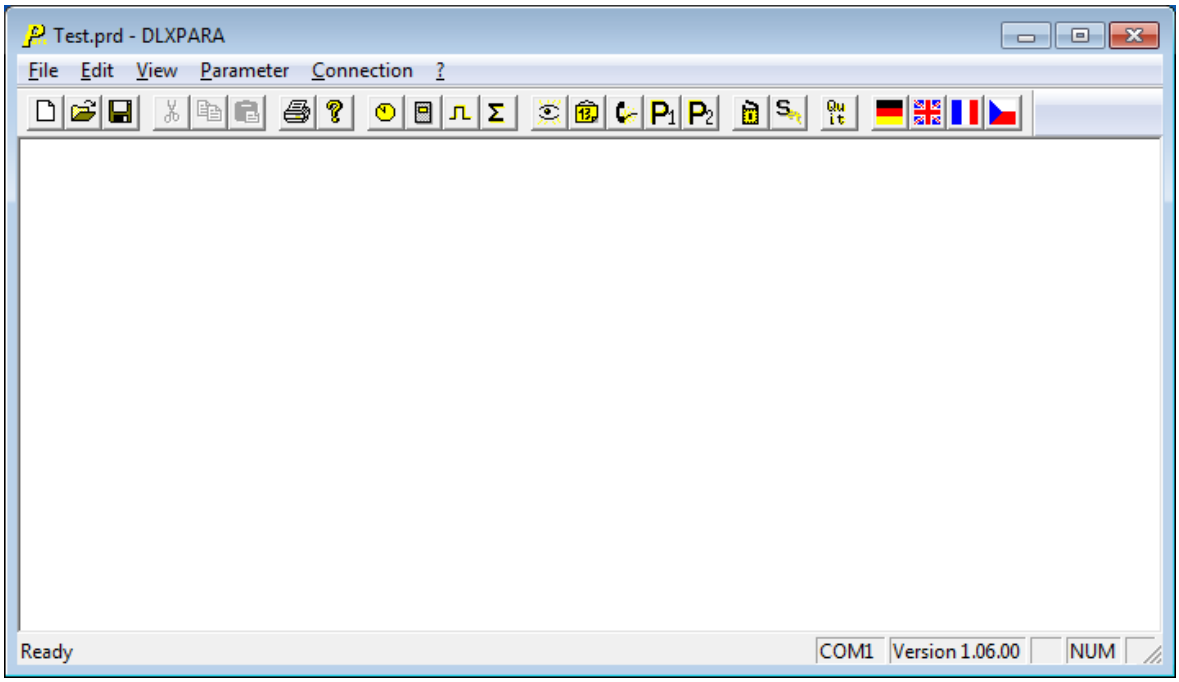
DLXPara

Programming Software

User Manual | Doc.-No.: E116011212056



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1 General

1.1 Short description

The programming software **DLXPara** can be used to program a DLX unit via the serial communication interface. The DLX can only be programmed with this programming software.
If the parameter settings are saved in a parameter file, several DLX can be programmed with identical or similar settings without having to laboriously re-establish these parameter settings.

1.2 Contents

The software package contains a CD ROM and this user manual.

- **This manual describes the complete functionality of the programming software. Individual menu items may differ from this manual.**

1.3 System requirements

Computer:	PC, minimum Intel Pentium 500MHz or comparable PC / Laptop
Main memory:	≥ 256 MB
Hard disk:	ca. 1 MB for installation and ≥ 1 MB for parameterization files
Disk drives:	Minimum CD ROM
Interfaces:	Minimum one RS232 interface (COM1 to COM30); Alternative: USB interface with converter from USB to RS232

Operating system: **Microsoft Windows 7** / **Vista** / **XP**,
Windows 2000 / **2003** / **2008 Server**,
Windows NT 4,
Windows 98SE / **ME** / **95** and up

Recommendation of the manufacturer: **Microsoft Windows 7** / **XP**

2 Installation

In order to install the programming software all files on the shipped CD ROM need to be copied onto the hard disk drive of the PC or Laptop computer (e.g. into the directory „DLXPARA“).
For automatically installation insert the CD-ROM in the respective drive. The start menu automatically appears. If this is not happening, open the Microsoft Windows Explorer and then choose:

DLXParaV106xxSetup

Directory for installation:
\Program files\Baer Industrie-Elektronik GmbH\DLXPara

Program name: **DLXPara**

For installation on a computer with Windows 7 please change the Properties – Compatibility – Privilege Level of the **DLXParaV106xxSetup**-Software.

Set the mark “Run this program as an administrator”.

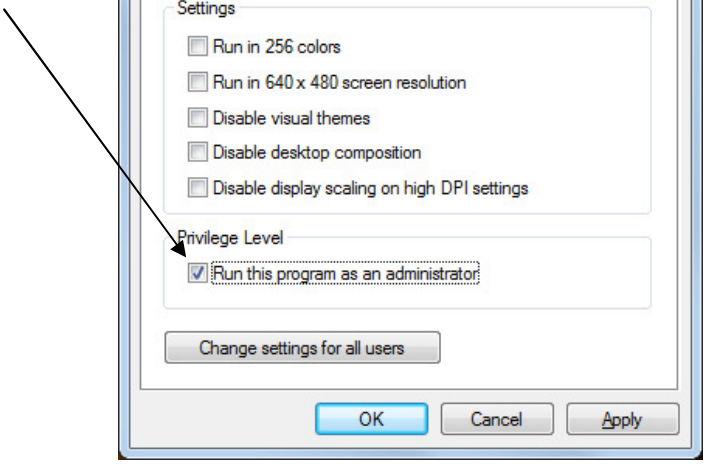


Figure 1, Properties

Following start the Setup-Program.

2.1 Manually installation

The following paragraphs explain how to install the programming software on a computer where it was previously not installed and no such directory exists.

Example: Installation from CD drive D: (source drive) onto hard disk drive C: (target drive on the hard disk), into a newly created directory named "DLXPARA".

1. Insert the CD ROM into the CD drive.
2. Start the MS Windows Explorer and select the root folder of the drive on which the programming software shall be installed (click on the drive symbol on the left-hand side of the screen).
3. Create a new folder named „DLXPARA“ on this drive (File – New – Folder).
4. Now select the CD drive (click on the symbol with the name „D:“ next to it).
5. Select all files on the right hand side of the screen and copy them into the newly created folder named „DLXPARA“.
6. The programming software is now installed on drive C: in the folder „DLXPARA“.

If you would like to be able to start the software without using the MS Windows Explorer, you can create a shortcut on the so called desktop of your computer (the desktop is what you see on the screen when no applications are running or when all applications are minimized). Move the mouse pointer to an empty area of the desktop (somewhere over the background image) and press the right hand button. From the dropdown menu select the item “New” and wait for the next dropdown menu to open. Now select “Shortcut”. In the dialog that is now open, either enter the complete path to the **DLXPara** software or click on “Browse” to locate the program. Now click on the button “Next” and enter a description for your shortcut. We suggest you use “**DLXPara**”. Now click on “Finish”.

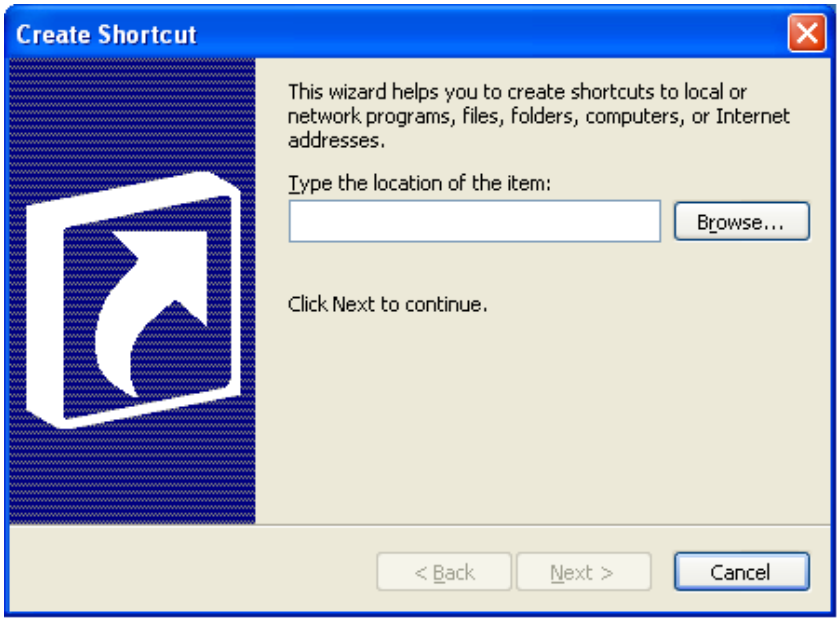


Figure 2, Creating a shortcut

You can move this new shortcut to anywhere on the desktop by pressing the left hand button on the mouse (while the mouse pointer is over the icon) and then moving the icon while keeping the button pressed. When you release the mouse button, the icon will be dropped onto the desktop.

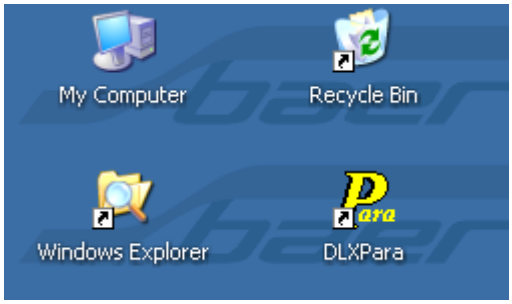


Figure 3, Icon on desktop: DLXPara

2.2 Update

For an update just overwrite the file **DLXPARA.EXE** with the new release.

2.3 Uninstalling the program

In order to uninstall you manually have to delete **DLXPARA.EXE** and the directory and shortcut you may have created at installation.

2.4 Short description of the DLX device

The DLX was designed as a powerful device for the registration and processing of electrical impulses from energy meters, flow meters, heat flow processors and similar devices. It is meant for installation in bulk energy supply points, power station injection points, at special contract customers and industrial premises. Load profiles, calculated values and spontaneous events are processed and stored on the site. This data can be interrogated by hierarchically higher processing devices via a number of interfaces.

- The direct serial service interface (RS232) can be used to read and program the DLX via the programming software **DLXPara**. Compatible data retrieval software (e.g. SIGLON) can be used to read data on site.
- The data interface (RS232, 20mA/CS, M-Bus or RS485) can be used to retrieve data on site via data retrieval software. Alternatively an external modem can be connected (via RS232).
- The modem interface can be used to connect via the internal modem (optional) to the public switched telephone network (PSTN) and data can be uploaded to a PC. Alternatively it is possible to use ISDN- or Ethernet-Modem.

  An optional PC-Card (backup memory) can be used to store the content of the periodical buffers and the spontaneous event buffer as well as part of the device parameters. This PC-Card can be read by compatible data retrieval software via standard card readers and a PC.

  Load management (switching off and on of loads) can be realized on site via external load management software, using the control outputs of the DLX.

3 Starting the programming software

Double click on the file named "**DLXPARA.EXE**" in the MS Windows Explorer to start the programming software (or double click on the desktop icon, see previous page).

After the start of the programming software the monitor displays the main window (explanation of the main window: see chapter "Main window" on page 15)

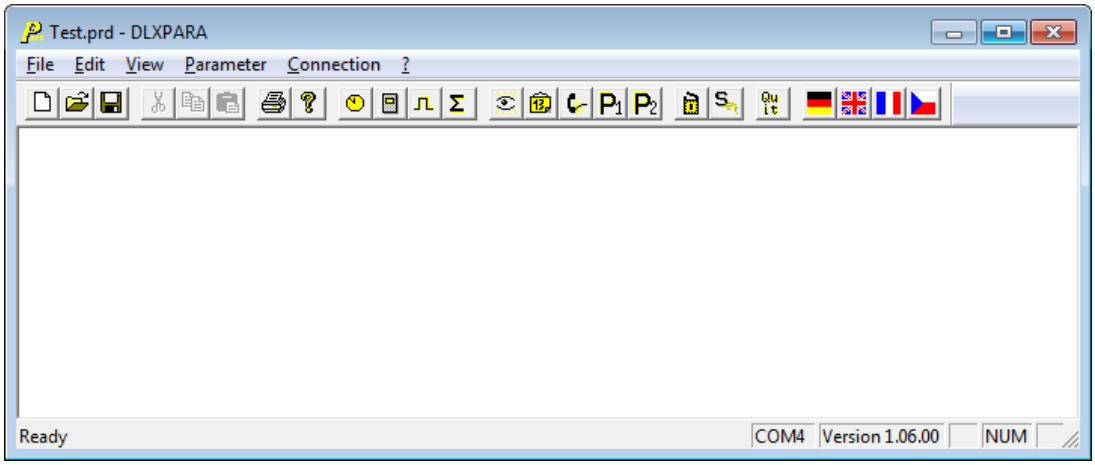


Figure 4, Main window

You can reach the main menu in this window either with the function key "F10", with the "hot keys" or by clicking with the mouse pointer on any of the menu items.

- **Any changes to the parameters in a DLX unit require the correct input of a password**

3.1 "Invisible" items

In various dialogs items have no function, if particular other parameters are not set or set to specific values. These items are then either not shown at all on the screen or they appear grayed out. Only once the superceding parameters are set to the required values, these items will appear or be activated.

Example: In the dialog "Time" the input fields for date and time are only activated if the radio button "Edit time" is selected. Once you select the radio button "Internal PC time", these input fields are grayed out and cannot be selected.

3.2 Application environment

Parameters in the DLX can be changed via the programming software **DLXPara** (RS232) only.

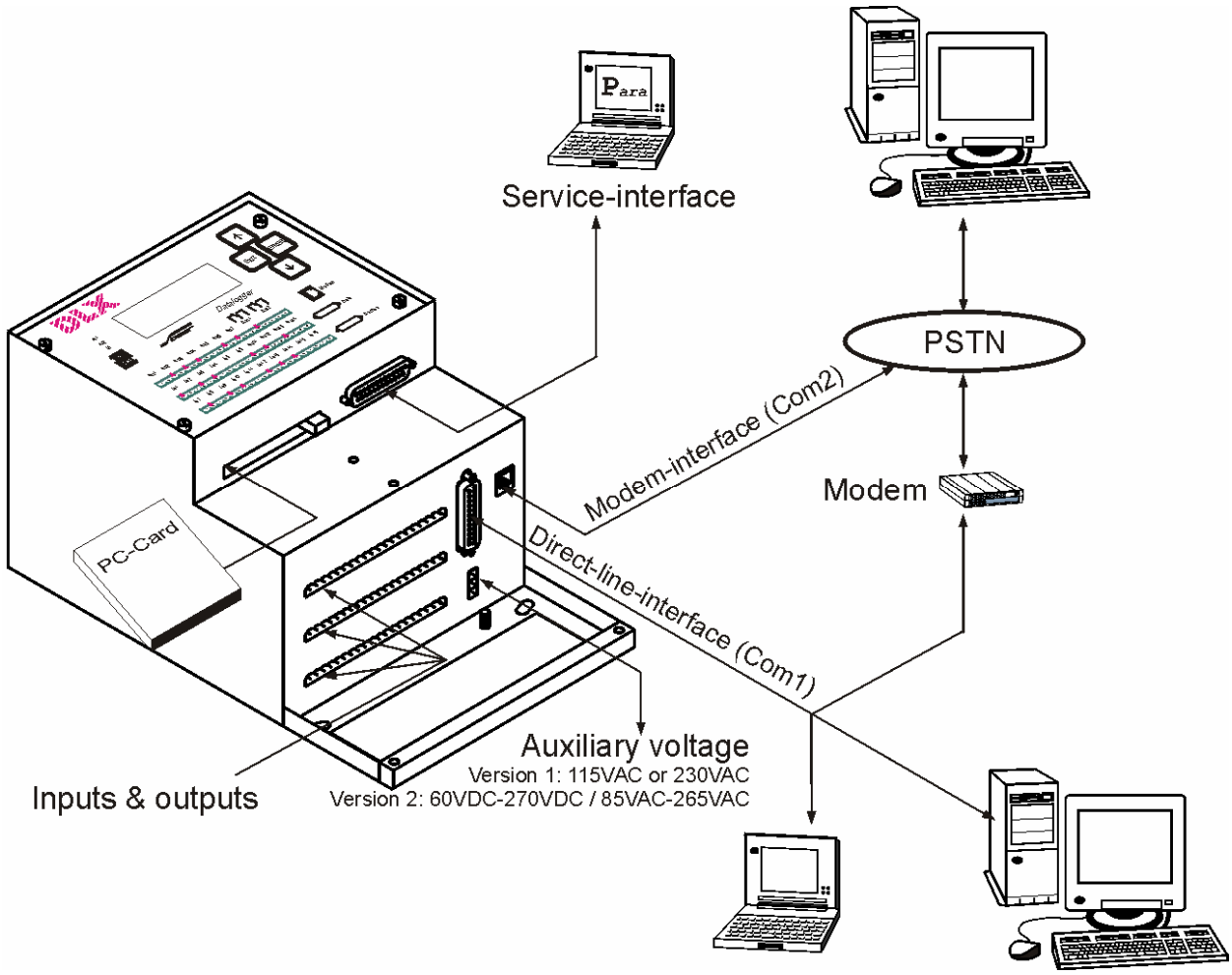


Figure 5, Graphical representation of the application environment

4 General functions

4.1 Main window

After starting the software, the main window of the programming software is displayed.

The main window contains the menu bar, the task bar and the status bar.

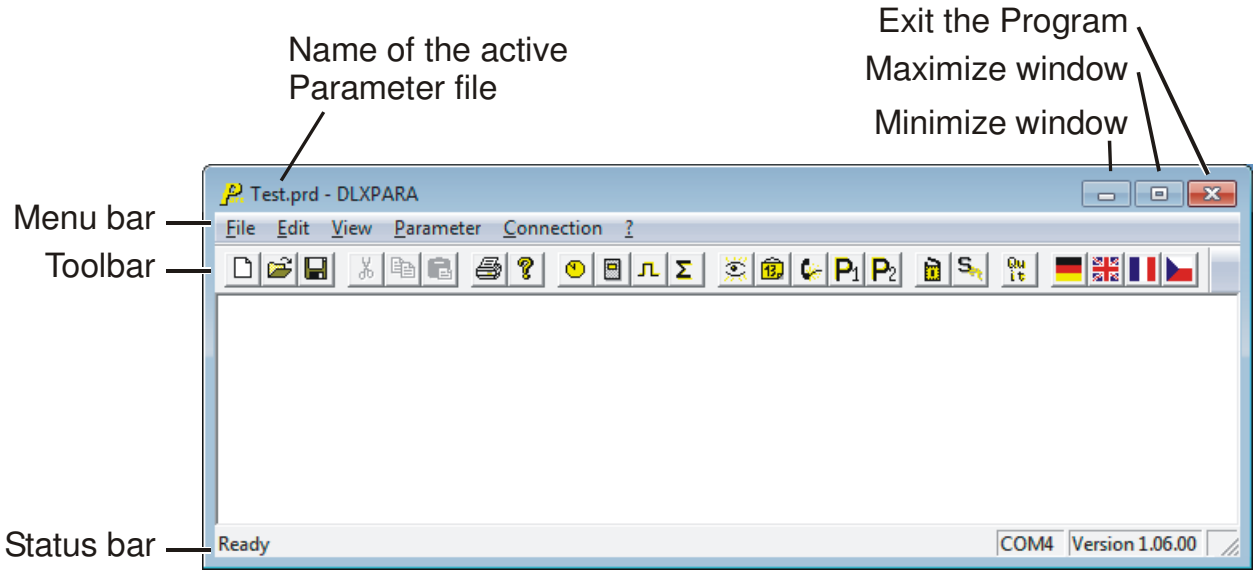


Figure 6, Control elements

4.2 Menu bar

The menu bar is located at the top edge of the window. In the menu bar you can call up the following main menu items by selecting them with the mouse:

File	Edit	View	Parameter	Connection	?
New	Undo	Tool bar	Time	Password	About para…
Open…	Cut	Status bar	Number of …	Password change ▸	
Save	Copy		Units	Factory settings	
Save As..	Paste		Counter values	Set all parameters	
Print…			Pulse in-/outputs ▸	Change pulse ratio	
Print Preview			Analog inputs	Get parameters	
Print Setup…			Control in-/outputs ▸	Port	
Exit			Scroll List	Language ▸	
			Registration period		
			Tariff calendar ▸		
			Communication ▸		
			Periodic buffer ▸		
			Memory		
			Extra (device display)		

▸ Menu items with an arrow (▸) have subsequent menu items.

4.3 Tool bar

The tool bar is located underneath the menu bar. It contains buttons with icons used for quick access to menu items. If the mouse pointer comes to rest over a button, a brief description of that button is displayed after a short period of time.


New file


Open file


Save file


Print


Information about **DLXPara**


Time


Number of …


Pulse ratio (pulse weighting)


Sum components


Scroll list


Tariff calendar


Communication


Periodic buffer 1 (Load profile 1)


Periodic buffer 2 (Load profile 2)


Password


Set all parameters


Exit software


Select language: German / English / French / Czech

4.4 Selecting (menu) items

You have several options how to select a (menu) item of the programming software.

4.4.1 Selection with the mouse

Move the mouse pointer to the desired location and click with the left mouse button. If you want to edit a value in an input field, you can select and replace the entire value in that field with a double-click (press the left mouse button twice in quick succession) without having to delete it first (you can recognize this by the change of the background color). If you only want to edit particular digits of a value, you can place the cursor with a single click of the left mouse button at the desired position in the field, but you still need to delete undesired digits (by using the key “Del”)

4.4.2 Selection with the keyboard

Press the function button "F10" to open the menu bar and now use the arrow keys to select the desired dropdown menu. Once the dropdown menu is open, move the selection bar with the arrow keys to the desired menu item and press the “Enter” key.
Within a menu item (i.e. a dialog window) you can jump from one item to the next with the “Tab” key (you can recognize the currently selected item by the either a change in the background color or by a surrounding rectangle of dashes).
You can also jump backwards by pressing the “Shift” and the “Tab” key together. After selecting an item, the complete value in that item (if it is an input field) is automatically selected (you can recognize this by the different background color) and you enter a new value without having to delete the old one. If you only want to modify a particular digit of the value, you can use the arrow keys (“Left” and ”Right”) to move the cursor to the desired position, but you still need to delete undesired digits by using the “Del” key.

4.4.3 Selection with "Hot" keys

You can select menu items by pressing a combination of keys. Press and hold down the “Alt” key and then press the key with the underlined letter in the desired menu item.
To edit any values use the methods as described under “Selection with the keyboard”.

4.5 Controls

4.5.1 Action buttons

You will find the following action buttons in many dialogs:

Cancel: If you click on this button (or press “Enter” while this button is selected) all changes to values will be discarded and the dialog window closes.

Figure 7, Action button “Cancel”

OK: If you click on this button (or press “Enter” while this button is selected) all changes to values or settings will be saved in internal memory of your PC and the dialog window closes.

Figure 8, Action button “OK”

- **If you want to save the currently set values to the hard disk, you need to select the menu item “Save” or “Save as” before exiting the programming software.**

  Parameters in the DLX can be changed either via the programming software **DLXPara** or via the keypad of the DLX (only certain registers), however any changes to parameters are only possible after input of a valid password. All modifiable parameters are divided into two groups: settable and programmable (a complete list of all parameters can be found in appendix B of the DLX User Manual). On each change of a parameter the DLX unit will first check the setting of the program protection switch (located on the backside of the display, see DLX User Manual). If programming of the unit is disabled (e.g. after the unit has been certified), only settable parameters can be modified. Write access to programmable parameters is only possible after the certification seal has been removed. The device must then be re-certified, if relevant regulations exist. Once programming of the unit has been enabled, all parameters can be changed.

- **You should perform a unit restart (to factory default settings) before programming a DLX.**
- **Changes to some of the parameters will trigger automatic erasure of the load profile memory.**
- **During the transfer of new parameters into the DLX no data retrieval is possible due to data integrity considerations.**

The following two action buttons can only be used when a DLX is connected to the PC (“online programming”):

Set: If you click on this button (or press “Enter” while this button is selected), settable parameters in the DLX will be changed to the settings in the programming software, the setting of the program protection switch will not be checked.

Figure 9, Action button “Set”

Set parameter: If you click on this button (or press “Enter” while this button is selected), programmable parameters in the DLX will be changed to the settings in the programming software. The program protection switch must be in the position "Set Enable".

Figure 10, Action button “Set parameter”

- **The relevant password must be entered correctly before changing any parameters (settable or programmable) in the DLX, otherwise the unit will not change the parameters and will display a corresponding error message.**

Note: During the changing of parameters the DLX automatically switches to the standard display.

For more information see chapter “Password” on page 83.

4.5.2 Selection controls

Radio buttons

Out of a number of radio buttons surrounded by a group rectangle, only one can be active at any one time.

⊙ radio button is active, the related item will be activated during parameter changes.

○ radio button is inactive, the related item will be deactivated during parameter changes.

Check boxes

Out of a number of check boxes one or more can be active (checked) at the same time.

☑ check box is active, the related item will be activated during parameter changes.

☐ check box is inactive, the related item will be deactivated during parameter changes.

You can activate or deactivate these controls by clicking on them with the mouse, by selecting them via the keyboard or by using the “hot” key for the control.

➢ **If you use the keyboard to operate the software, then you need to select each check box by using the arrow keys and then select the desired state by using the space bar (each time you press the space bar, the state of the check box changes).**
Once you have selected all the correct values press the “Enter” key to save all changes to the internal memory of the PC and to close the dialog.

4.5.3 Text input controls with scroll bars

In dialogs supporting the input of values to a number of similar items (e.g. in the dialog “counter values”) you can select the individual items without having to leave the input field.

To do this, place the cursor into the input field (using the mouse) and enter the value. You can now use the arrow keys (cursor down or up) to select another item in the scroll box and the input cursor stays in the input field.

4.6 Connection to the DLX

For the connection between the DLX and the PC a programming cable or modem cable (#6998, 25 pin SUB-D connector according to ISO2110, pin assignment acc. To V.24/RS232C/DIN 66020) with the following pin assignments is required:

DLX (25-pin, "female")		cable	PC (25-pin, "male")		
In-/Output	Pin-No.		Pin-No.	In-/Output	Signal
Input	**2**	———	**2**	Output	TxD (transmit data)
Output	**3**	———	**3**	Input	RxD (receive data)
Input	**4**	———	**4**	Output	RTS (Request to send)
Output	**5**	———	**5**	Input	CTS (Clear to send)
Output	**6**	———	**6**	Input	DSR (Data set ready)
	7	———	**7**		GND (Ground)
Input	**20**	———	**20**	Output	DTR (Data terminal ready)

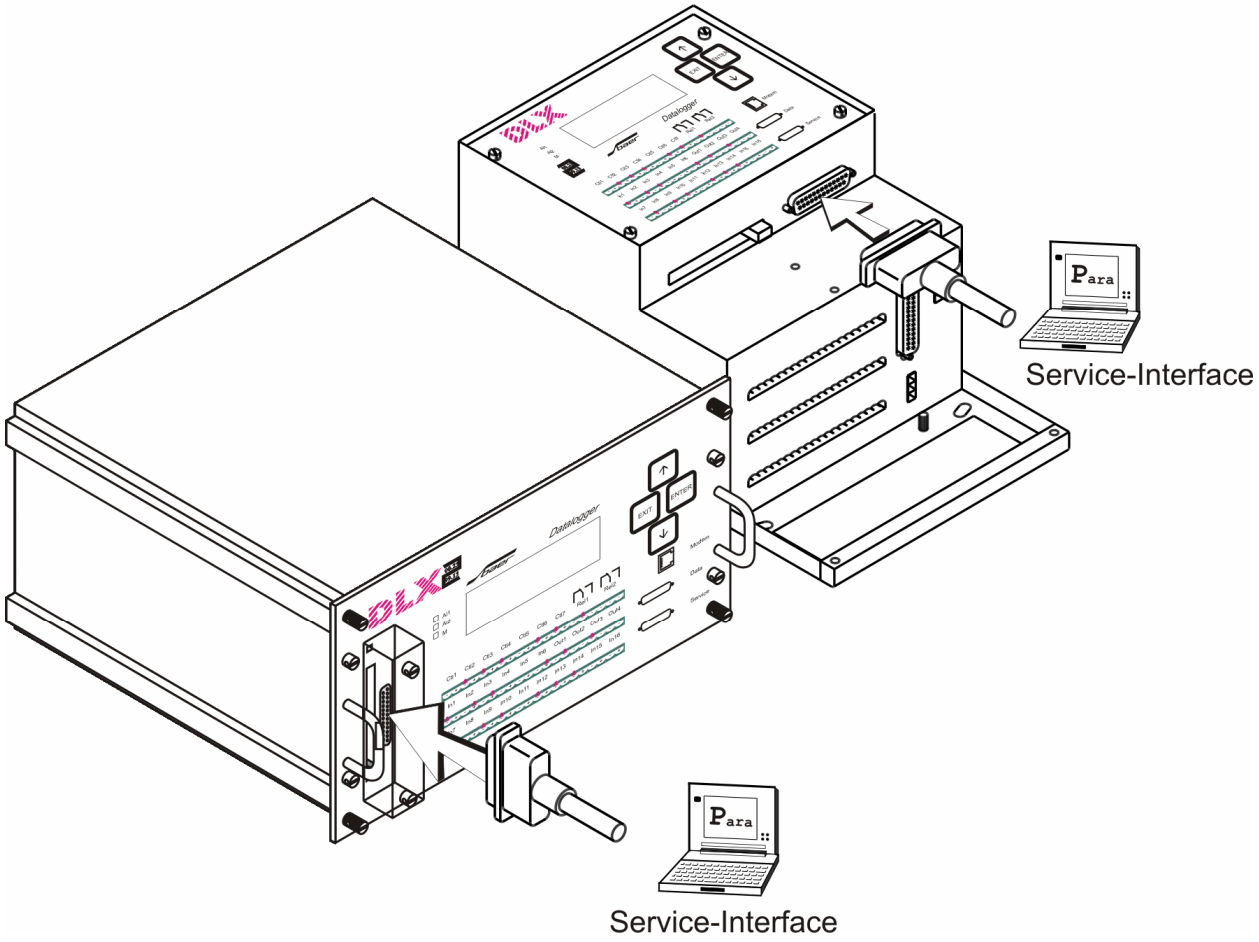


Figure 11, Location of the service interface at the DLX

The DLX can be programmed in the following ways:

1. “Online-programming”: individual parameters are sent directly from the relevant dialog windows to the DLX by using the action buttons “Set” or “Set parameters” after having been modified.
2. By using the menu item “Set all parameters”.

   Please proceed as follows:

   - Connect the service interface of the DLX with a free COM port of your PC using a programming cable.
   - Put the program protection switch of the DLX into the position “Set Enable” (see DLX User Manual).
   - Create or open a parameter file.
   - Enter the valid password (menu item “Password”).
   - Program the DLX (menu item “Set all parameters”).

5 File

5.1 New

Creates a new (unnamed) parameter file with the default settings of the programming software.

5.2 Open…

Opens an existing parameter file.

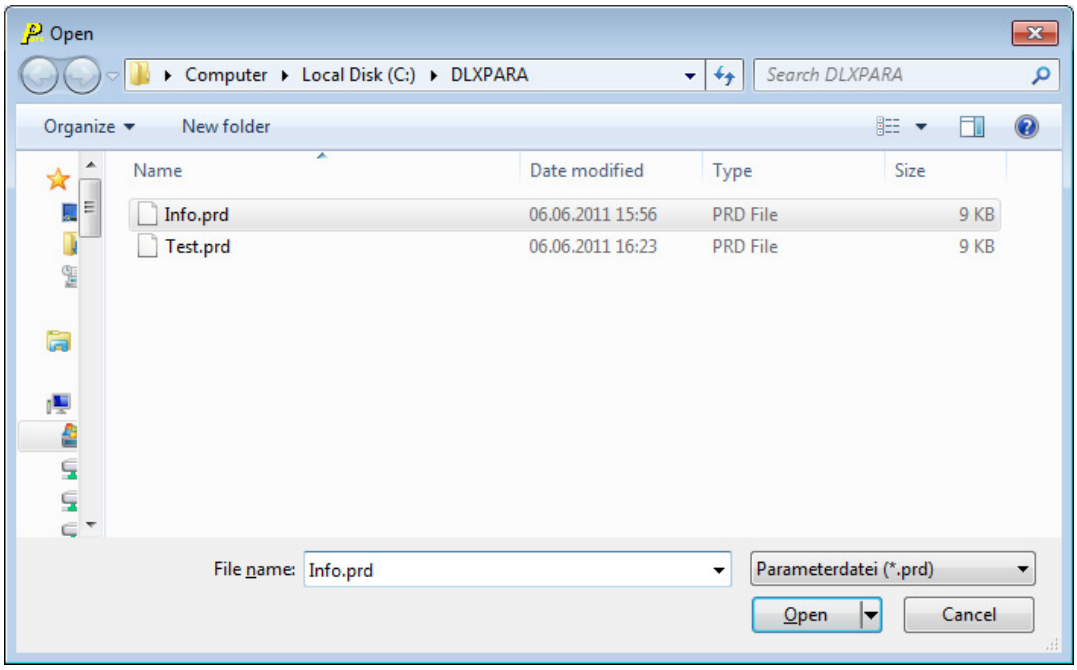


Figure 12, Open a file

This menu item allows you to read an existing parameter file (*.prd). The four most recently used parameter file names are shown at the bottom of the “File” menu. If you select any of them it will be opened automatically.

5.3 Save

Saves the parameters in the open parameter file. With this menu item you can save any modified parameter settings in the currently open file. If no parameter file is currently open, the menu item “Save as” will be activated.

5.4 Save As...

Saves the parameters under a new filename in the current directory.

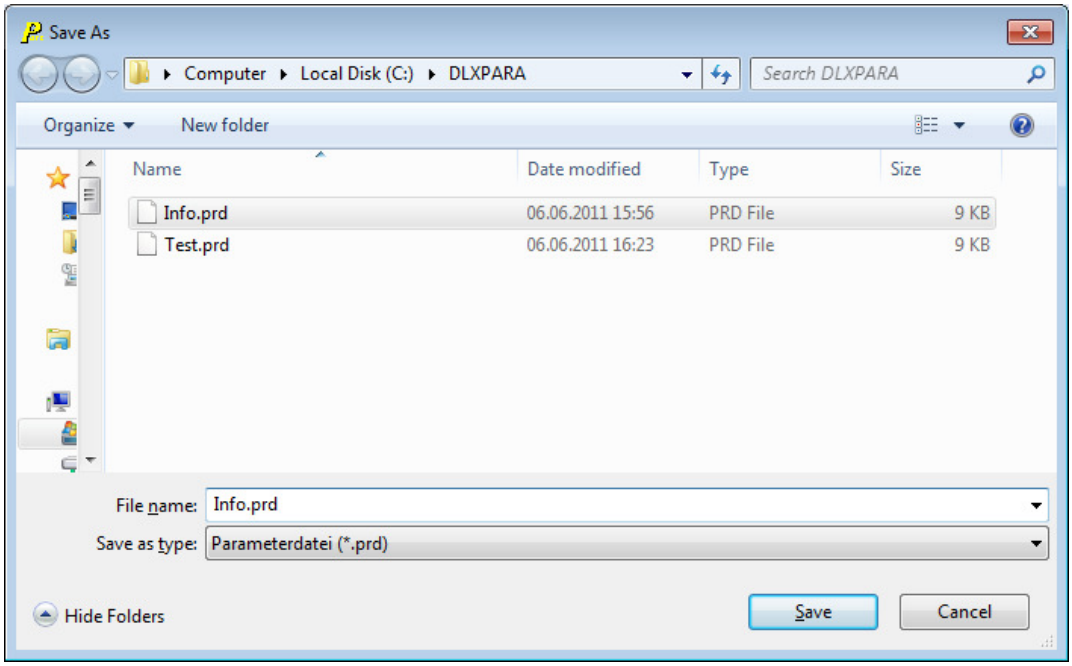


Figure 13, Save file as ...

5.5 Print

Prints the currently open parameter file in clear text to the selected printer.

5.6 Print Preview

Shows the currently open parameter file page by page (in the way it would be printed).

5.7 Print Setup

Allows you to select a printer and a number of other options.

5.8 Exit

If you want to exit the programming software, select the menu item “Exit”, click on the button in the upper right hand corner of the main window, the button or use the key combination “Alt” and “F4”.

- **If you have not saved your data by using the menu item “Save As…” or “Save”, it will be lost when you exit the software.**

6 Parameter

All parameters are collected in groups/submenus.

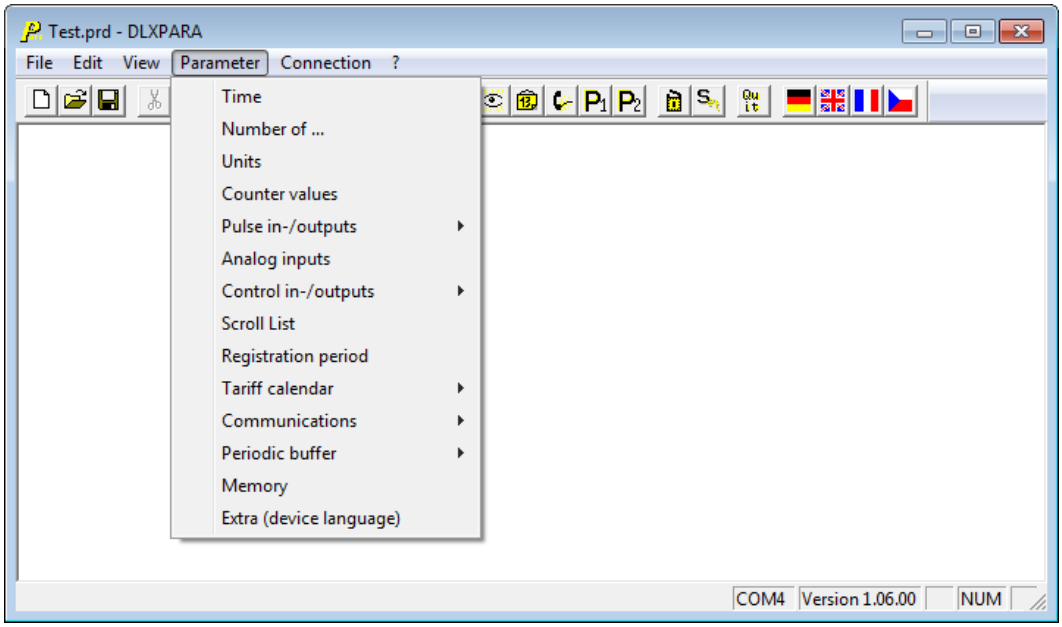


Figure 14, Parameter

Note: Set the parameters step by step: firstly the time and lastly the extras.

Without input of the correct password for “Parameters” no parameters can be transmitted to the DLX: for more information see chapter “Password” on page 83.

6.1 Time

Set the time, parameters for the synchronization and summertime switching including the date and time of the switching.

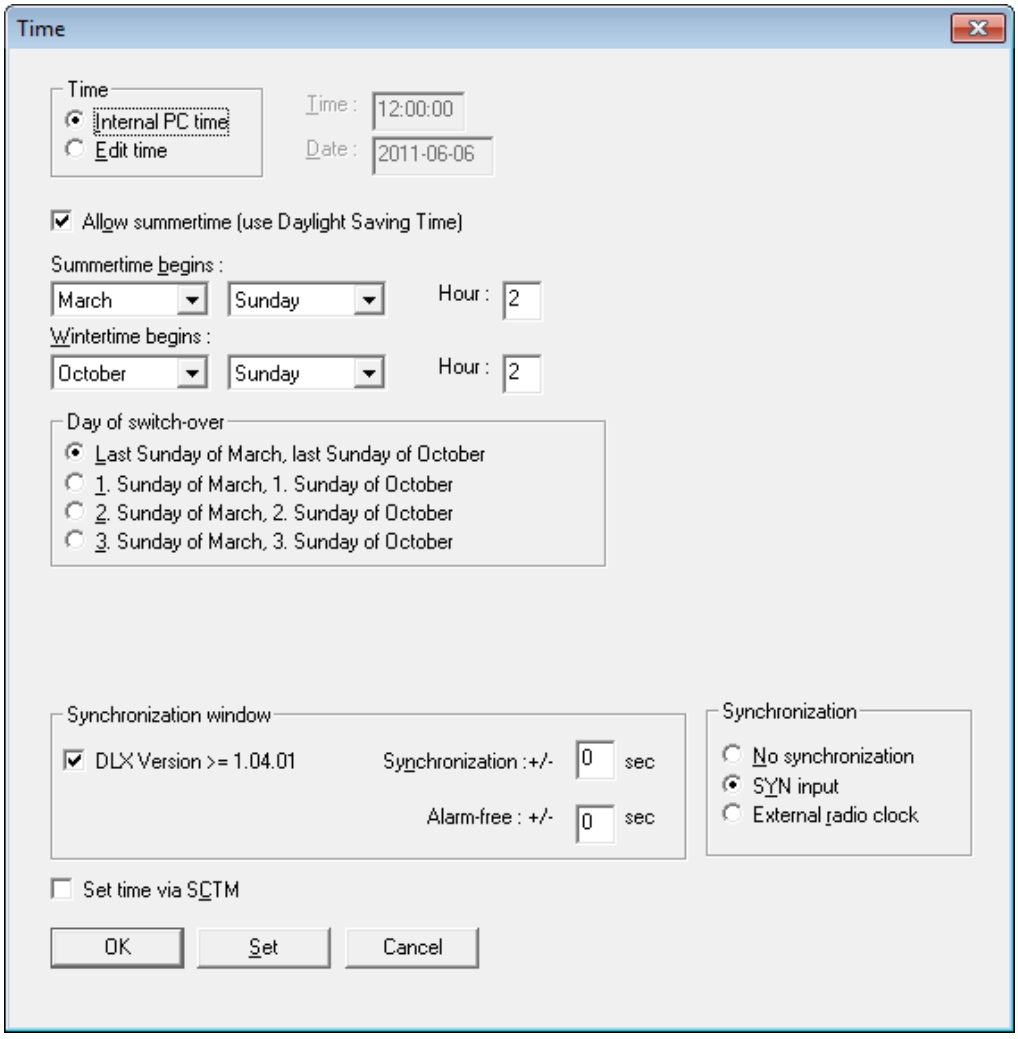


Figure 15, Setting the time parameters

Time

Internal PC time:
The DLX will be set to the current date and time of the PC where the programming software is installed.

Edit time:
The DLX will be set to the values entered into the fields “Date” and “Time” at the time of setting all parameters.

Time/Date:
Input fields for the date and time to be programmed into the DLX.

Allow summertime (Automatically adjust clock for Daylight Saving Time)

Activates summertime/wintertime switching.

The switching from summertime to wintertime (and vice versa) happens at the date and time as defined under “Summertime begins”, “Wintertime begins” and “Day of switch-over”.

Summertime begins:

Defines the month, weekday and hour of the summertime start.

Wintertime begins:

Defines the month, weekday and hour of the wintertime start. For the start of the wintertime you must define the time to which the hour will be set, i.e. for a switch-over from 03:00 to 02:00 you must define the value “2” for the hour.

Day of switchover:

Defines the day for the summertime/wintertime switching.

In our example (see Figure 15, Setting the time parameters) the following switch-overs will happen:

Wintertime to summertime: last Sunday in March from 02:00 to 03:00
Summertime to wintertime: last Sunday in October from 03:00 to 02:00

Synchronization window:

Defines the period of time (time window) during which **synchronization** via the SYN input is possible. If you enter a value between 1 and 29 (in seconds) then synchronization to the closest full minute is only possible in this time window around the end of registration period MP1.

Alarm-free:

Inside synchronization window an alarm-free window can be defined. When the DLX is synchronized out of the alarm-free window (but inside the synchronization window) a warning is generated (alarm number: 07/02)

Note: If you set the synchronization time to “0”, you can always synchronize to the closest full minute.

Example:

Sync window:	10 seconds
Alarm-free:	10 seconds
Registration period:	Tm1 = 15 minutes

→ Synchronization only permitted in a window of +/- 10 seconds around each full 15 minutes (where minutes = 0 or 15 or 30 or 45).

- **DLX firmware releases up to and including 1.04.00 didn’t support the sync window (alarm-free only). For release including 1.04.01 and up set the version-mark.**

Synchronization

No synchronization:
Incoming pulses at the SYN input have no effect on the time.

SYN input:
Incoming pulses at the SYN input set the seconds in the DLX to “0” (see also menu item “Control inputs” on page 43).

External radio clock:
The DLX will be synchronized by the external (DCF77) radio clock receiver module (currently to “0” seconds only).

Note: Synchronisation one time per measuring period only.

Example:

SYN input active at..		The DLX will set the time to..	
Date	Time	Date	Time
2002-12-31	23:59:55	2003-01-01	00:00:00
2003-01-01	00:00:05	2003-01-01	00:00:00
2002-12-31	23:59:29	2002-12-31	23:59:00*
2002-11-28	11:54:30	2002-11-28	11:55:00*

* Synchronization to a minute that is not identical with the end of registration period is only possible if the synchronization window is set to ‘0’.

- **The SYN input and the radio clock receiver module of the DLX cannot detect whether the internal device time is set properly (date, hours, and minutes)! The unit will only set the seconds to “0” and the minute to the closest minute value (see table above)!**

Set time via SCTM:
Enables the transfer of date and time during remote data retrieval when using the SCTM protocol (e.g. via modem). Per registration period (Tm1) is only one attempt (for set time) possible.

6.2 Number of …

Definition of the number of inputs, tariff rates, summation units, apparent demand and balance calculation.

After every change set all parameters: see chapter “Set all parameters” on page 88.

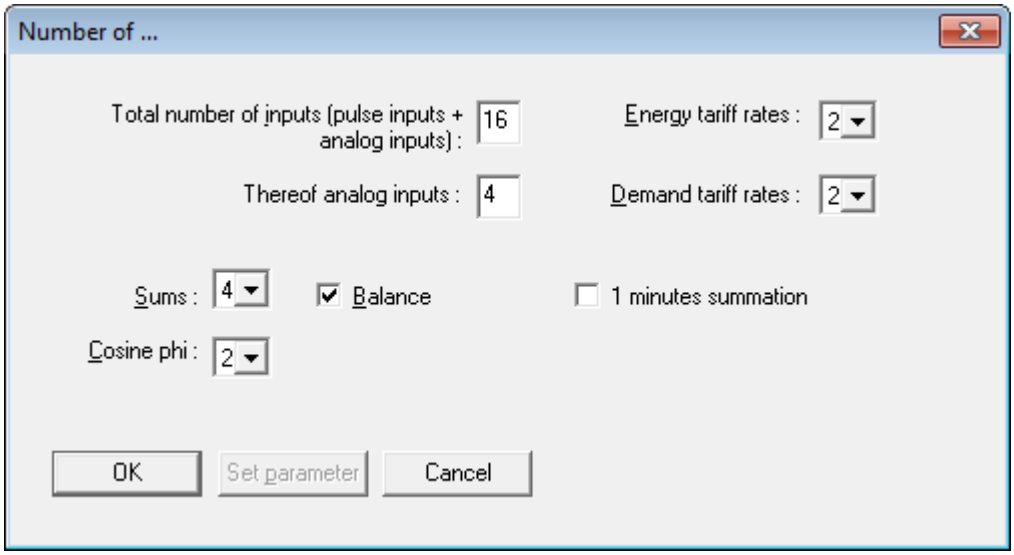


Figure 16, Number of inputs, sums, tariff rates

Total number of inputs:
Defines the number of inputs in the DLX: pulse inputs and analogue inputs. This number must be between 1 and the number of physically available inputs (max. 16)! If your DLX unit is equipped with only 6 input modules, then this number must be between 1 and 6!

Sums:
Defines the number of summation units in the DLX (between 0 and 4). If you set this figure to “0”, no summation will take place.

Cosine Phi:
Defines the number of apparent demand units and cosine phi (φ) units in the DLX (between 0 and 2). If you set this figure to “0”, no apparent demand or cosine phi (φ) will be calculated.

Energy tariff rates:
Defines the number of energy tariff rates. This figure must be between 1 and 4!

Demand tariff rates:
Defines the number of demand tariff rates. This figure must be between 1 and 4!

Balance:
Activates the calculation of the differential balance (for demand values only). The DLX calculates the difference (or balance) between the total demand in forward direction and the total demand in backward direction and stores the result at the end of registration period (!) in the relevant register of the summation unit. The other register of that summation unit will then contain the value “0”.

1 minutes summation (option, on request):
Calculation for energy and MD only at the end of every minute (Tm1 and Tm2)

6.3 Units

Definition of the measurement unit text strings

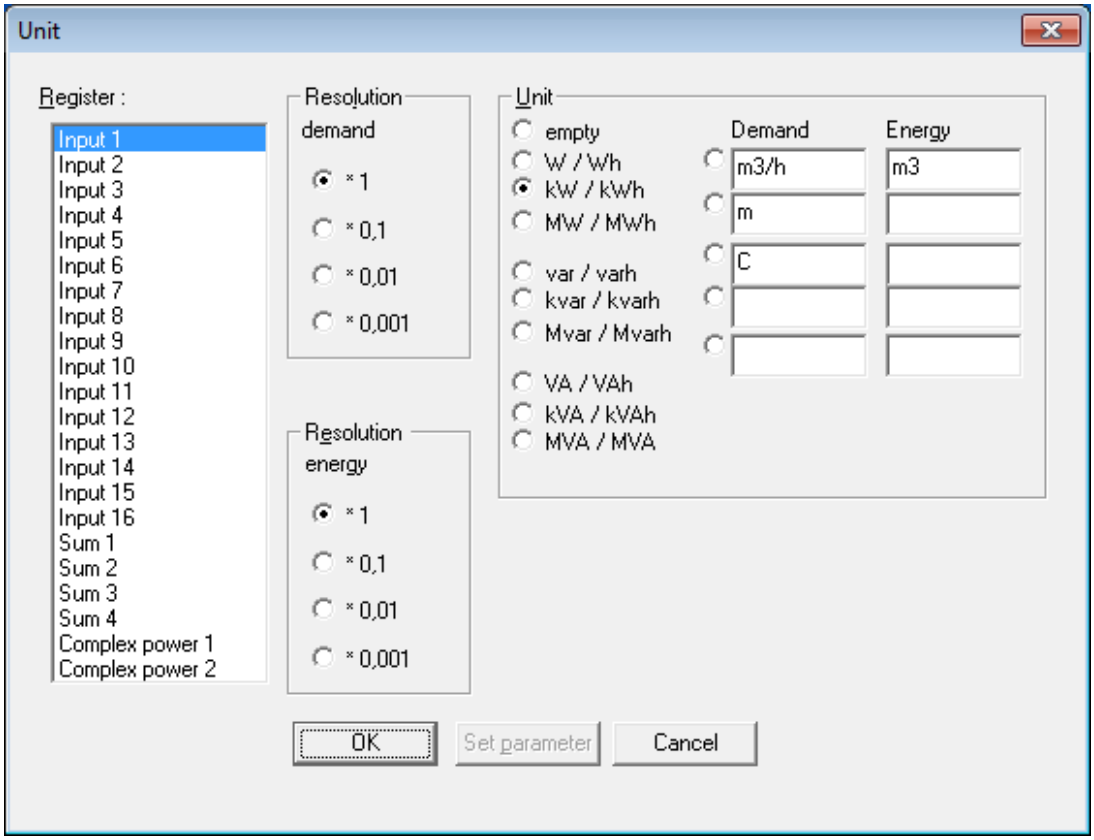


Figure 17, Measurement unit text strings

Register:

Selects the inputs, summation unit or complex power unit (as defined previously)

Resolution demand / energy:

Selects the number of decimals for each register (e.g.: 12kW, 12,3kWh, 12,34kvar, 12,345kvarh).

Unit:

Here you can define the correct physical unit for demand and energy for each defined register. In addition to a selection of frequently used units for active, reactive and apparent energy/demand another 5 unit text strings can be defined and used freely (e.g.: m3/h, m3, t, K, C). Special characters are not possible (e.g. m³)!

6.4 Counter values

Definition of the counter values for total energy and for each tariff rate.

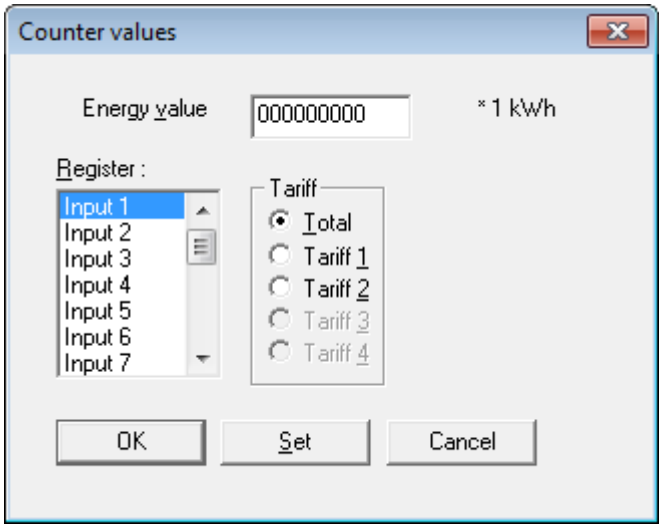


Figure 18, Counter values

Register:
Select the input for which you want to adjust the energy value (the counter or meter reading).

Tariff:
Select the tariff rate for which you want to adjust the energy register value.

Energy value:
Here you can define the energy value (the register or meter reading) for the selected input or register. You can use the value “000000000” (9 digits) as start value.

6.5 Pulse in-/outputs

All impulses at the inputs will be counted after debouncing and then processed according the table below.

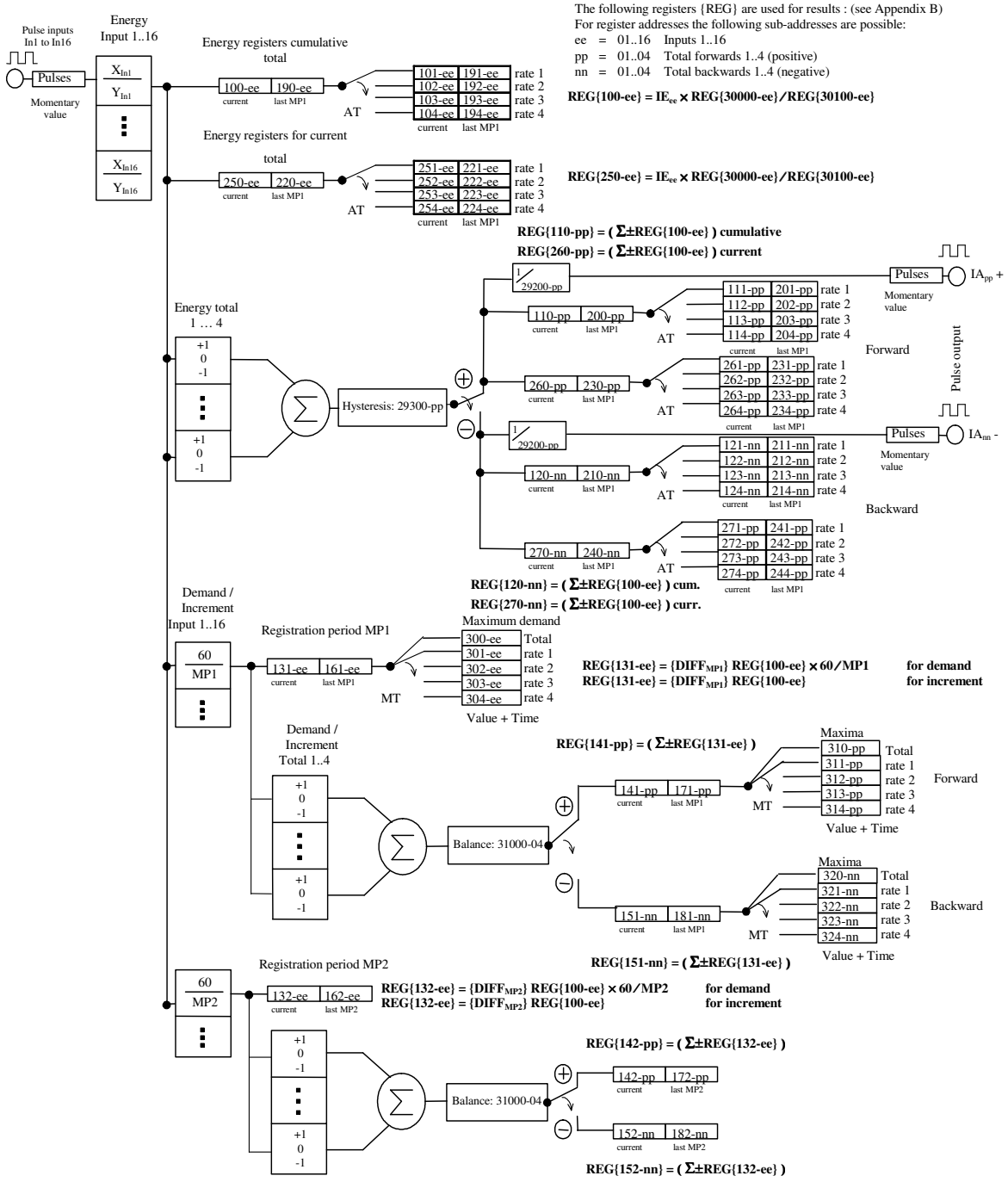


Figure 19, Block circuit diagram of impulse processing

➢ **Any calculation of values for registration period 2 (MP2/Tm2) only takes place if a period duration other than 0 was defined in the menu item "Load profiles".**

6.5.1 Input debouncing

Definition of input conditioning parameters for each input (dependent of meter).

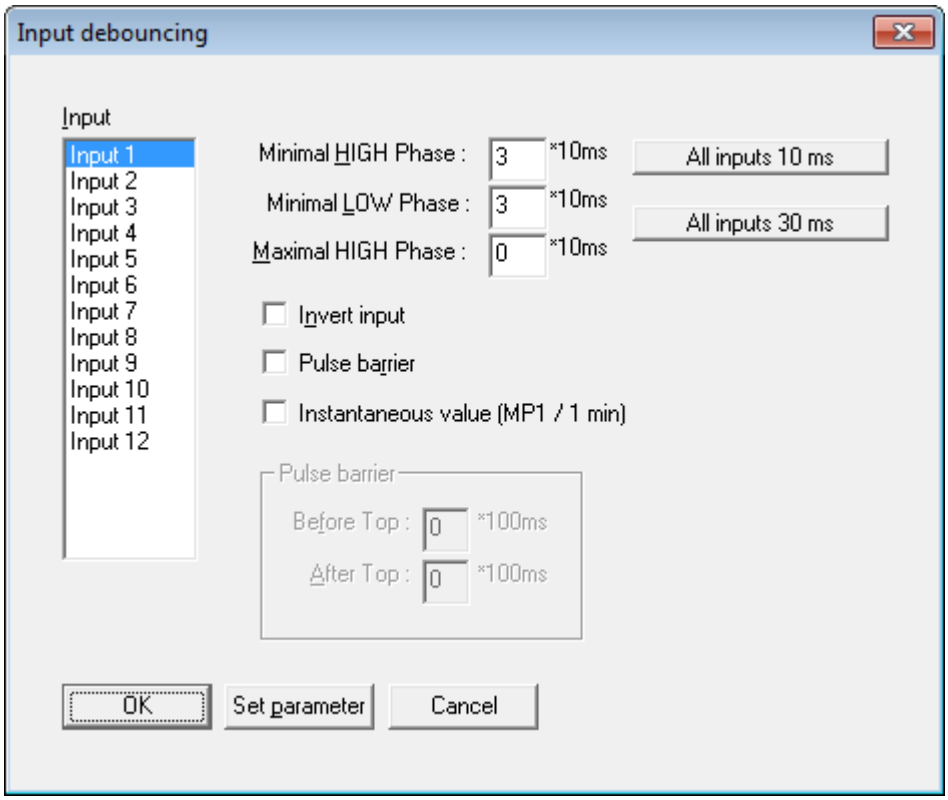


Figure 20, Input debouncing

Input:

Selects the input for which the conditioning parameters shall be displayed and defined. Each input can have its own settings for signal conditioning. Select the required input and then define the minimum time for HIGH and LOW phases as well as the maximum time for the HIGH phase.

Minimal HIGH-Phase:

Defines the minimum length of incoming pulses. Pulses shorter than this duration are not accepted by the DLX and will not be registered. The default setting is 30ms (3×10ms).

- **If your DLX is equipped with bi-current input modules (IED) or signal current input modules (0..20mA or 4..20mA up to firmware version 1.05.06), then for these inputs you must set the minimum HIGH phase value to "1" to prevent loss of incoming pulses!**

All inputs 10 ms

With this button you can set all inputs to 10ms (or 30ms).

Minimal LOW-Phase:

Defines the minimum length of the interval between two incoming pulses. Intervals shorter than this time will not be accepted by the DLX and as a consequence the pulses will not be counted separately. The default setting is 30ms (3×10ms)

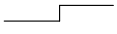
- **If your DLX is equipped with bi-current input modules (IED) or signal current input modules (0..20mA or 4..20mA up to firmware version 1.05.06), then for these inputs you must set the minimum LOW phase value to "1" to prevent loss of incoming pulses!**

Maximal HIGH-Phase:

If an incoming pulse has a duration longer than this value, the DLX will not register it (pulse length monitoring). This function is deactivated by entering the value "0".

Invert input:

By default the DLX counts pulses on their rising edge. When you select to invert an input then pulses will be counted on their falling edge.

Example: Standard pulse:  (Change from LOW to HIGH-Phase)
Inverted pulse:  (Change from HIGH to LOW-Phase)

Pulse barrier:

With pulse barrier enabled all pulses arriving in a time window around the end of registration period (Top) are buffered. These are forwarded in the next registration period, synchronizing all following devices. This is done to accomplish identical figures at main and control measurement.

- **This can cause pulses appear as packets at pulse outputs and summation registers!**

Features:

- individually configurable for every input
- time range: +/- 9.9 s around end of registration period (Top)
- settable in steps of 100 ms

Instantaneous value (MP1 / 1min):

For special calculation (e.g. fill level, fluid level, temperature) at the end of registration period it is possible to activate the measuring for the last minute in every registration period. This function can be activated only for registration period MP1/Tm1 (Buffer 1)

6.5.2 Pulse ratio

Definition of the numerator and denominator of individual inputs depending on meter constants, transformer ratios and reading constants.

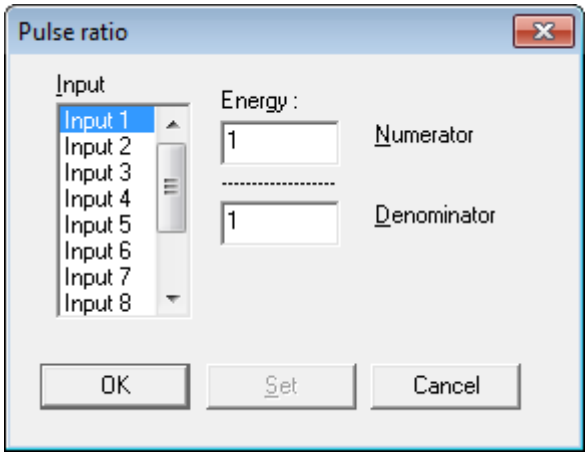


Figure 21, Pulse ratio

Input:
Selects the input for which the weighting factors need to be adjusted.

Energy-Numerator:
Here you enter the numerator for the selected input, calculated from the formulas below.

Energy-Denominator:
Here you enter the denominator for the selected input, calculated from the formulas below.

In order to correctly calculate the energy represented by input signals of different origins it is necessary to standardize the incoming pulses to a common unit and weight. You use the pulse weighting factors for each input to achieve this. The pulse weighting factors are represented by whole numbers with 8 digits each for numerator and divisor.

Note: For calculation of the analogue inputs 0..20mA or 4..20mA (from firmware version 1.06.00 and up): see menu item “Analog inputs” on page 42.

Energy value weighting:

Meter with transformer: $\frac{X}{Y} = \frac{W}{R \times K}$ (pulse inputs)

Meter without transformer: $\frac{X}{Y} = \frac{Const}{K}$ (pulse inputs)

or $\frac{X}{Y} = \frac{DIFF}{72000 \times K}$ (signal current input 0..20mA)

or $\frac{X}{Y} = \frac{DIFF}{57600 \times K}$ (signal current input 4..20mA)

X, Y	Numerator (X) and denominator (Y), whole numbers, 8 digits
W	Transformer ratio (primary to secondary): $\frac{U_{pri}}{U_{sec}} \times \frac{I_{pri}}{I_{sec}}$
R	Meter constant (e.g. Imp/kWh), can be found on the front plate of the transmitting meter.
K	Reading constant, usually assumed to be K = 1
Const	Impulse constant (e.g. kWh/Imp)
DIFF	Transducer range (max. $value_{encoder}$ - min. $value_{encoder}$) := 20Hz

Enter the correct values into the above formulas and reduce the result to the smallest value represented by whole numbers. Then enter the result into the input fields for the relevant input. The demand is automatically calculated by using the ratio between numerator and divisor and the registration period in the device.

For signal current inputs only:
Offset:= minimum value (only positive values will be saved and transmitted to the AMR software)

Example 1: Meter with transformer

Meter constant: R = 300 Imp/kWh

Transformer ratio: W = 200

Reading constant: K = 1

Therefore: $\frac{X}{Y} = \frac{200}{300 \times 1} = \frac{200}{300}$ or $= \frac{2}{3}$

The resolution for the display of energy values is 1kWh, for demand values it is 1kW.

Example 2: Meter without transformer

Impulse constant: Const = 2,5 kWh/Imp

Reading constant: K = 1

Therefore: $\frac{X}{Y} = \frac{2,5}{1} = \frac{2,5 \times 10}{1 \times 10} = \frac{25}{10}$

Example 3: Signal current input: 0..20mA with 0..3500kW

→ Reading constant K = 1

Therefore: $\frac{X}{Y} = \frac{3500}{72000 \times 1} = \frac{35}{720}$ or $= \frac{7}{144}$

The resolution for the display of energy values is 1kWh, for demand values it is 1kW; offset:= 0kW

Example 4: Signal current input: 0..20mA with 1000..4500kW

→ Reading constant K = 1

Therefore: $\frac{X}{Y} = \frac{3500}{72000 \times 1} = \frac{35}{720}$ or $= \frac{7}{144}$

The resolution for the display of energy values is 1kWh, for demand values it is 1kW; offset:= 1000kW

- **If you need to total several inputs in a summation unit, then the reading constant "K" must be the same for all of these inputs!**

6.5.3 Sum components

Σ Define the allocation of inputs to summation units

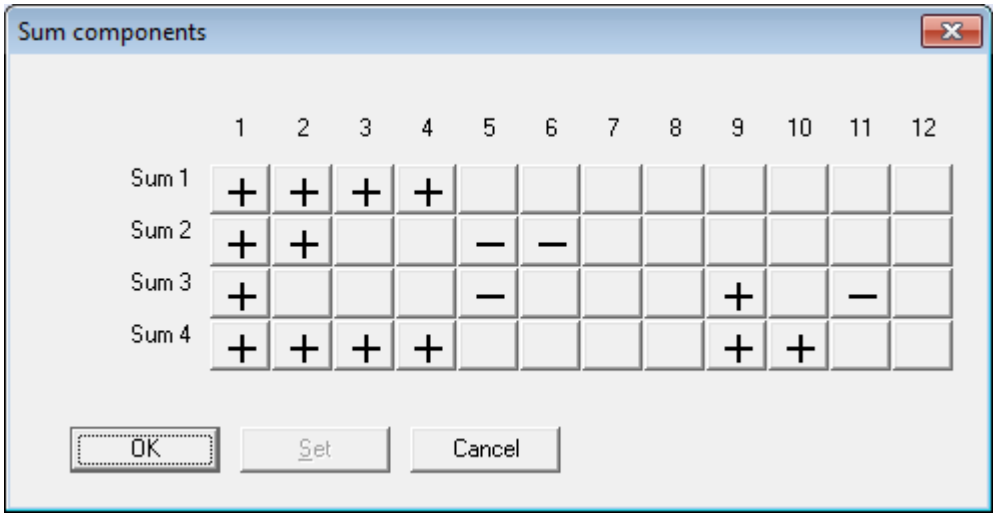


Figure 22, Input allocation to sums

Sum:
Allocation of inputs (1 to 16, only pulse inputs are possible) to the desired summation unit. You can toggle between "+", "-" and " " (inactive) by clicking on the buttons with the mouse or by selecting a button and then using the space bar. Use the "Tab" key to move between rows of buttons and the arrow keys to move from one button to next within the row.

\+ Plus The input will be totaled into the positive sum.

− Minus The input will be totaled into the negative sum.

Empty The input will not be totaled.

In our example:

Sum 1 = Input 1 + Input 2 + Input 3 + Input 4
Sum 2 = Input 1 + Input 2 – Input 5 – Input 6
Sum 3 = Input 1 – Input 5 + Input 9 – Input 11
Sum 4 = Input 1 + Input 2 + Input 3 + Input 4 + Input 9 + Input 10

- **Each summation unit in the DLX uses two registers: a positive sum and a negative sum (e.g. import/export for forward and backward energy flow)**

6.5.4 Summation outputs

Define the output pulse length, the hysteresis and the nominator for the selected summation unit output.

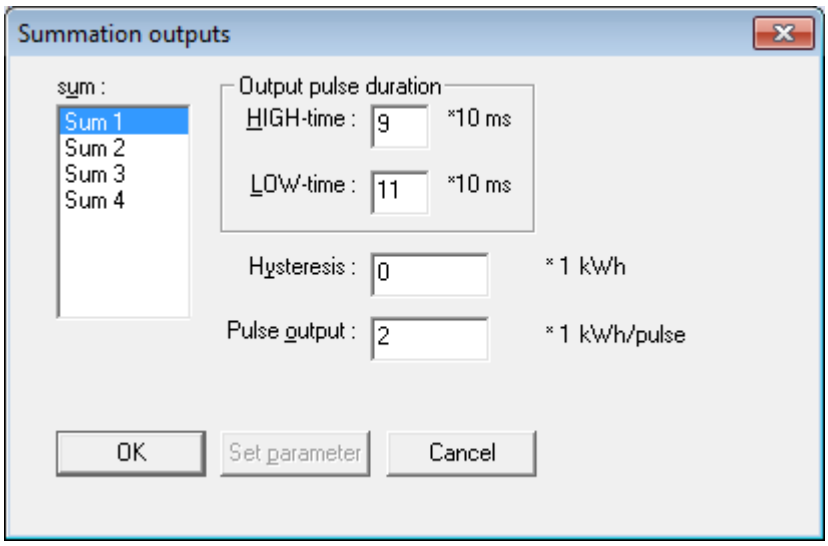


Figure 23, Summation outputs

Sum:

Select the summation unit for which the output pulse length, the hysteresis and the nominator shall be defined.

HIGH-time:

Defines the length of the outgoing pulses. The resolution for the values is 10ms (in this example: 9 × 10ms = 90 ms). You can enter values between 1 (10ms) and 200 (2000ms).

LOW-time:

Defines the minimum length of the interval between two outgoing pulses (in this example: 11 × 10ms = 110 ms). You can enter values between 1 (10ms) and 200 (2000ms).

Hysteresis:

Defines the capacity of the slack register (Hysteresis: kWh or kvarh).

For the calculation of balanced sums the DLX can use a programmable slack or hysteresis. This is a temporary storage for incoming pulses. With each pulse of positive sign the content of the hysteresis register is increased by the value of that pulse, with each pulse of negative sign it is decreased accordingly.

Pulses only appear at the output of the summation unit once the programmable capacity of the hysteresis has been exceeded either in positive or negative direction. An integrated energy direction switch directs the pulses in the first case to the positive output and in the second case to the negative output (see “Figure 19, Block circuit diagram of impulse processing”).

We recommend using a hysteresis equal to the sum of numerators (from the pulse weighting dialog) of all active inputs.

If you set the hysteresis to “0”, the calculation of balanced sums is deactivated for that summation unit.

Pulse output:

Defines the value for the weighting of output pulses. The resolution and physical unit are the same as for the reading constant “K”. (see “Pulse ratio” on page 36)

Example: Reading constant K = 1 (for active energy: 1kWh)
Pulse output Out = 2 × 1kWh/Imp
→ each output pulse has the weight 2kWh/Imp (:=0.5 Imp/kWh)

6.5.5 Cosine phi and apparent demand

Define the parameters for the calculation of apparent demand and cosine phi (φ).

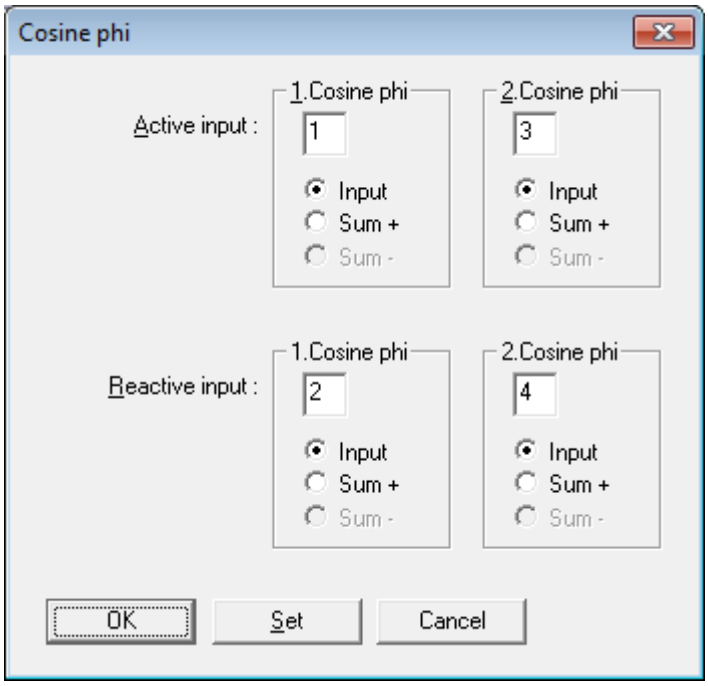
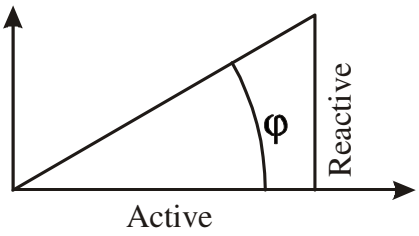


Figure 24, Calculation of cosine of phi and apparent demand

$$\text{Apparent demand} = \sqrt{\text{Active}^2 + \text{Reactive}^2}$$

$$\text{Cos}(\varphi) = \sqrt{\frac{\text{Active}^2}{\text{Active}^2 + \text{Re active}^2}}$$



Active input:

Define the source for the active energy: this can be either a pulse input or a summation unit.

Reactive input:

The correlated source for reactive energy: this can be either a pulse input or a summation unit.

6.6 Analog inputs

A continuous signal current flow is applied to the signal current inputs (e.g. 0..20mA or 4..20mA). This current is proportional to the actual demand. For firmware version from 1.06.00 and up: the average value (50 scans per second) will be send every second to the DLX-CPU: digital telegram.

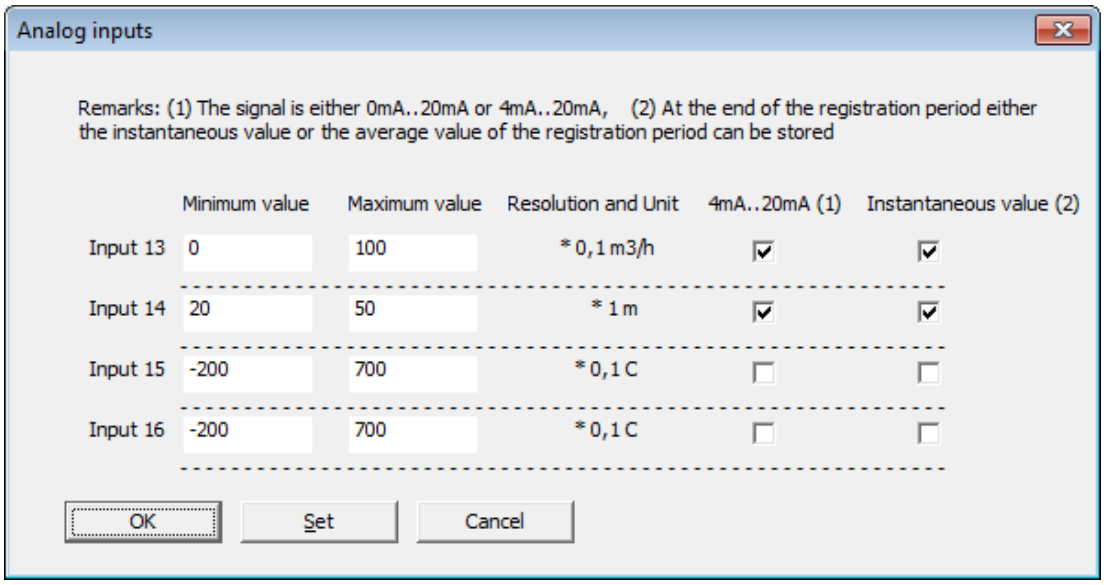


Figure 25, Analog inputs

Select the settings for every analog input:

- Minimum and maximum value;
- Set the offset 0mA or 4mA (correspond to the minimum value)
  20mA correspond to the maximum value;
- Calculation method: average value (over a measuring period) or instantaneous value (last data telegram at the end of measuring period);
- Offset:= minimum value (only positive values will be saved and transmitted to the AMR software)

Note: **Summation of the digital values is not possible!**

Examples: Signal current input: 4..20mA with 0..10m³/h (e.g. flow)
Reading constant K = 0,1; offset = 0m³/h

→ Minimum value:= 0 data storage:= 0
Maximum value:= 100 (100 × 0,1m³/h = 10m³/h) data storage:= 100

Signal current input: 4..20mA with 20..50m (e.g. water level)
Reading constant K = 1; offset = 20m

→ Minimum value:= 20 (20 × 1m = 20m) data storage:= 0
Maximum value:= 50 (50 × 1m = 50m) data storage:= 30

Signal current input: 0..20mA with -20°C..70°C (e.g. temperature)
Reading constant K = 0,1; offset = -20°C

→ Minimum value:= -200 (-200 × 0,1°C = -20°C) data storage:= 0
Maximum value:= 700 (700 × 0,1°C = 70°C) data storage:= 900

Note: Minimum value:= 0 and Maximum value:= 50 → analog input deactivated;

6.7 Control in- and outputs

6.7.1 Control inputs

Setting the parameters for control inputs:

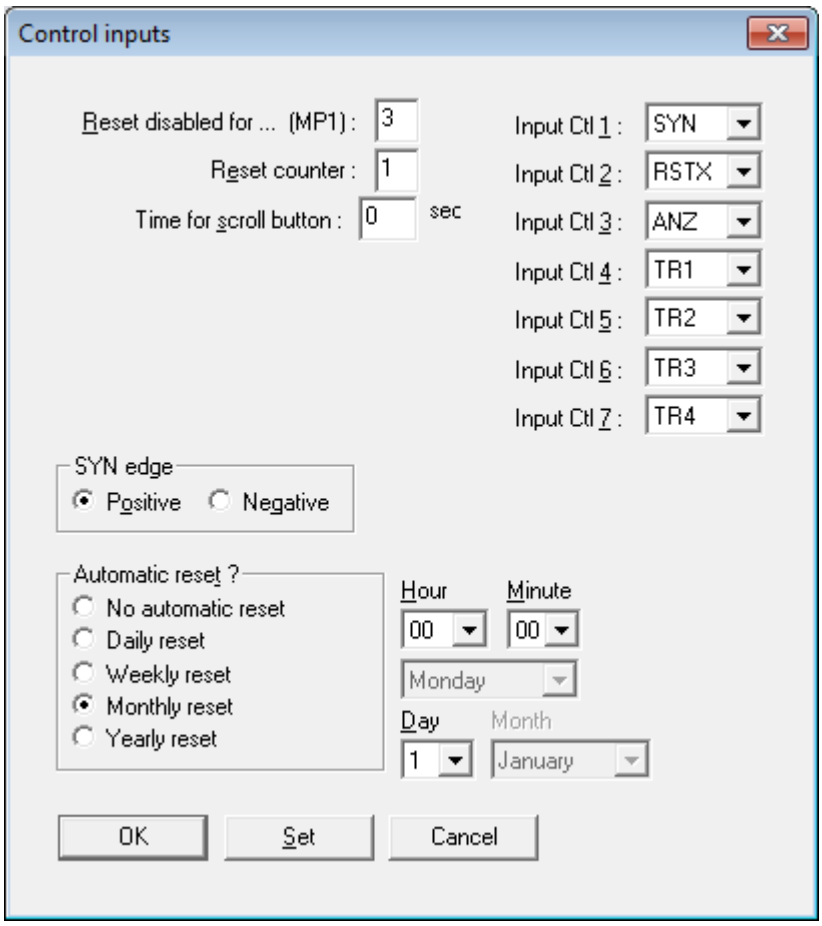


Figure 26, Control inputs

As an option the DLX can be fitted with several control inputs. Depending on the hardware version the following functions can be activated:

Reset disabled for… (MP1):
Defines the period of time during which no reset can be initiated (in registration periods MP1). The value can be set between 1 and 100 registration periods (value 0 is not permitted!).

Example: The registration period MP1 is set to 15 minutes, the reset is disabled for 3 registration periods: this results in a blocking time of 45 minutes for the reset.

Reset counter:
Defines the initial value for the reset counter (a value between 1 and 12). The reset counter will be increased by 1 on each reset. It rolls automatically over to the value 1. The reset counter can (as an example) be set equal to the current month.

Time for scroll button:
Defines the period of time between automatic scrolls to the next register address in the scroll list after pressing the “Enter” key on the DLX. If you set this value to “0” then automatic scrolling is disabled and the next entry in the scroll list is only displayed on the next press of the “Enter” key. The time is measured in seconds. The maximum time that can be defined is 240 seconds.

SYN edge:
Defines the polarity of the SYN input.
Default setting: synchronization on the rising (positive) edge of a pulse.

This control is only active once the SYN function is assigned to a control input.

Input Ctl1 to Ctl7:
Define the assignment of functions to control inputs. The following functions are available:

- SYN: external synchronization
- TR1 to TR4: control inputs for external tariff rate control
- RSTX: external reset
- Log 1 to Log 4: logic inputs; changes to these inputs can be stored.
- ANZ (ROLL): scrolling the display via an external signal
- (none) no function

Automatic reset:
Defines the time for automatic resets (billing list):

- No automatic reset
- Daily reset / billing list (Enter: hour, minute)
- Weekly reset / billing list (Enter: hour, minute and weekday)
- Monthly reset / billing list (Enter: hour, minute and day)
- Yearly reset / billing list (Enter: hour, minute, day and month)

6.7.2 Output assignments

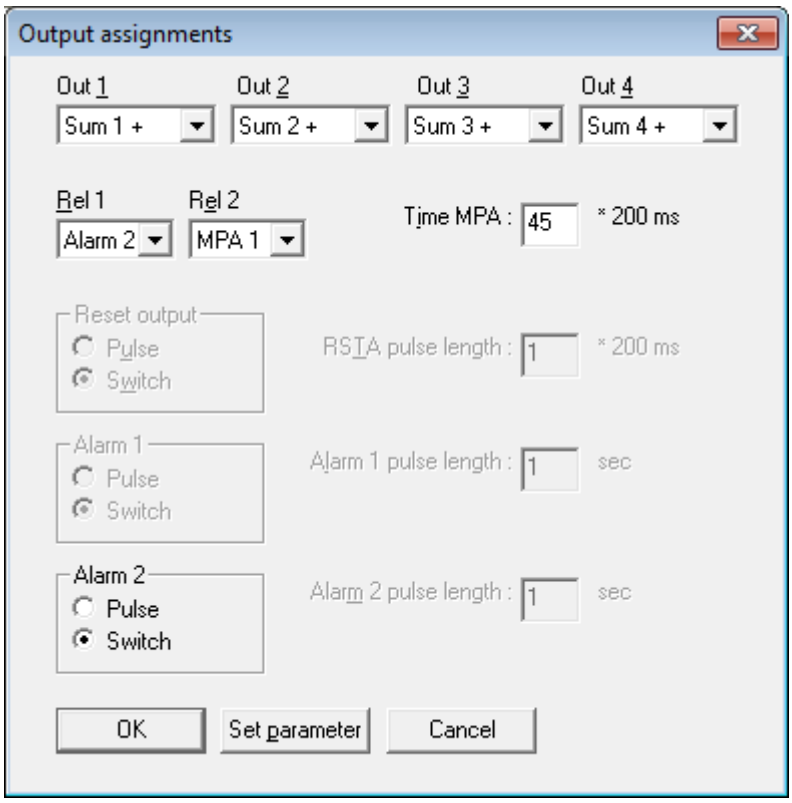


Figure 27, Assignment of signals to outputs

Out 1 - 4:

Assignments for pulse outputs of type "wipe" (solid state).

The following functions can be assigned to these outputs:

- Sum1+ to Sum4+: positive output of summation unit 1 to 4
- Sum1– to Sum4 –: negative output of summation unit1 to 4
- MPA1 and MPA2: registration period output for MP1/Tm1 and MP2/Tm2
- RSTA: reset output (time for billing list)
- Alarm 1 and 2: alarm outputs
- TRA1 to TRA4: tariff rate outputs 1 to 4
- Log1 to Log4: logic outputs
- In1 to In16: input pulses can be forwarded directly to outputs (1 to 1)
- (none) no function

Default settings: Out 1 to Out 4: unassigned

Rel 1 and Rel 2:

Assignments for mechanical relay outputs.

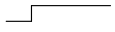
The following functions can be assigned to each relay output:

- MPA1 and MPA2: registration period output MP1/Tm1 and MP2/Tm2
- RSTA: reset output (time for billing list)
- Alarm 1 and Alarm 2: alarm outputs
- TRA1 to TRA4: tariff rate outputs 1 to 4
- Log1 to Log4: logic outputs
- (none) no function

default settings: Rel 1: Alarm 2
Rel 2: MPA1

➢ **Outputs of summation units cannot be assigned to mechanical relay outputs.**

For some output functions the type of output signal can be defined:

- Pulse:  pulse with variable length (in steps of 200ms for MPA and RSTA or in steps of 1 sec for alarms)
- Switch:  permanent state until the signal changes.

Time MPA:

Defines the length of time for which the registration period output shall be active at the end of a registration period. The typical value for MPA is 9 seconds (this corresponds to 45 x 200ms). The highest value for MPA is 20 seconds (this corresponds to 100 x 200ms). This value can only be set once MPA (MPA1 or MPA2) is assigned to an output. Possible values: 1 to 100.

Reset output:

Defines the mode for the RSTA output: pulse or switch. This can only be defined once RSTA is assigned to an output.

RSTA pulse length:

Defines the pulse length for the reset signal (for billing list). The typical value is 9 seconds (this corresponds to 45 × 200ms). The highest value is 20 seconds (this corresponds to 100 × 200ms). This can only be defined once RSTA is assigned to an output. Possible values: 1 to 100.

Alarm 1 or Alarm 2:

Defines the mode for Alarm 1 or 2: pulse or switch. This can only be defined once alarm signals are assigned to an output.

Alarm 1 or Alarm 2 pulse length:

Defines the pulse length for the alarm signals. The value set must be between 1 and 254 seconds. This can only be defined once alarm signals are assigned to an output.

6.7.3 Tariff control

Control of the tariff rates can be done via internal tariff calendar or external signals (e.g. ripple control receiver or radio clock). If external tariff control is activated then the tariff rates are defined by 4 control inputs (TR1, TR2, TR3 and TR4).

Valid control settings depend on the number of tariff rates defined for the unit (see page 29)!

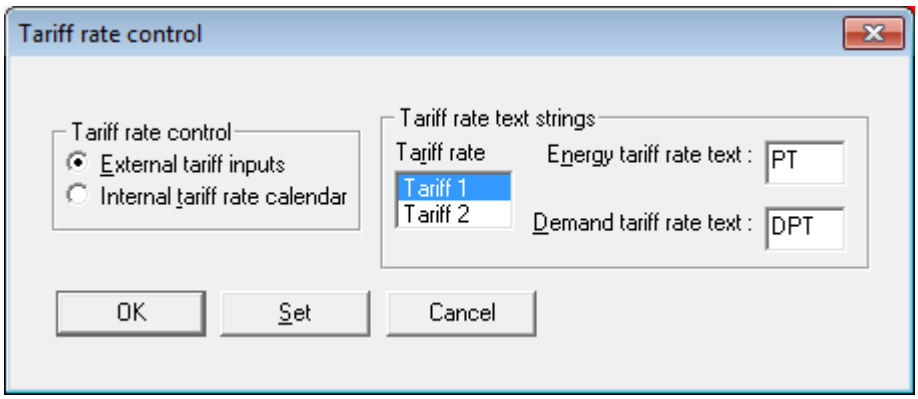


Figure 28, Tariff control

Tariff control

Select the control mode:

- External tariff control: activates external control (see menu item “Tariff control by inputs” on page 48).
- Internal tariff calendar: activates the settings for the internal tariff calendar (see menu item “Tariff calendar” on page 56).

Rate text

Energy and demand rates can be assigned a specific text (maximum 3 character) that will be display on the DLX, e.g. AT1, MT1, PT, DPT, ER1, DR1, etc.

Default settings: AT1, MT1, AT2, MT2 and so forth.

6.7.4 Tariff control by inputs

Define the assignments for the external tariff control inputs

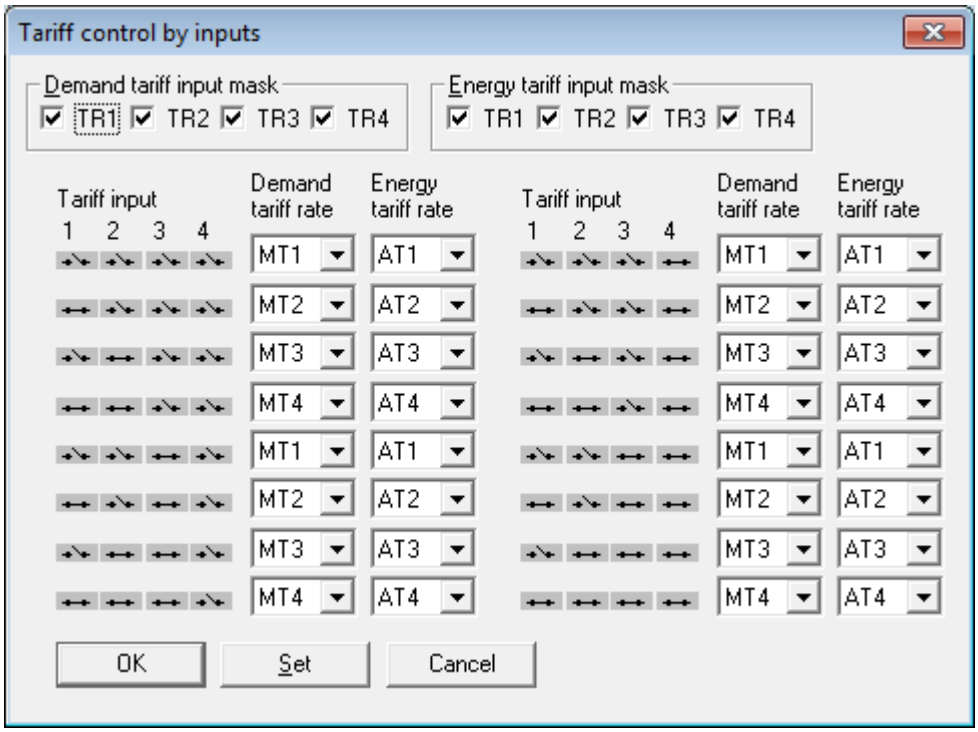


Figure 29, Tariff control by inputs

This dialog defines the setting of tariff rates in correlation to external control signals (this is only useful if external tariff control is activated)

Demand tariff input mask:
Defines the active control inputs for the definition of demand tariff rate settings (TR1 to TR4).

Energy tariff input mask:
Defines the active control inputs for the definition of energy tariff rate settings (TR1 to TR4).

You can assign one energy rate and one demand rate to each of the max. 16 combinations of rate control inputs. If a control input is not activated in the input masks for demand rates or energy rates (in the example above TR2 to TR4), then it assumes a default setting of " ‾_‾ ". More than one input combination (e.g. MT1 and) can be possible for one combination of demand rate and energy rate (e.g. in the picture above lines 1 and 5 in both the right and left column).

- **These settings will only be used if "external tariff control" is activated.**

Individual combinations are depicted in a graphical manner: control input open or closed.

6.8 Scroll list

The scroll list can only display values for information purposes!

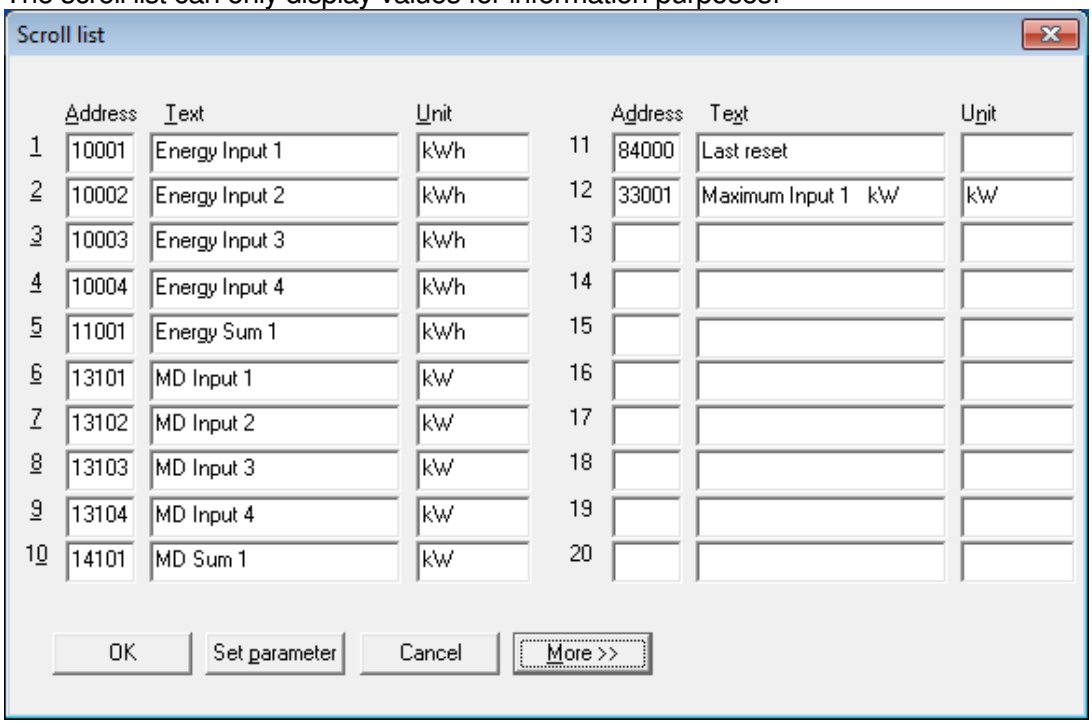


Figure 30, Scroll list

Address:

Enter the address of the register that shall be displayed after pressing the “Enter” key on the DLX.

- **If you enter the address “0” this means the end of the scroll list. The next press on the “Enter” key starts the scroll list from the beginning.**

Text:

For the purpose of easy interpretation you can assign a text of max. 20 characters to each address.

- **The display of the DLX cannot show special characters.**

Unit:

Enter the physical unit of the displayed value (e.g. "kWh").

Example: Enter the register address “84000” in the address field of line 11 and enter the text “Date of last reset” in the text field next to it.
After programming the DLX and starting the scroll list with the ENTER key, the 11th position in the scroll list will show the following display:

DDMONYYuHH:MM:ssrpsp	1. Line (standard display)
ATx MTx MPx YY-xx	2. Line (standard display)
Date of last reset	3. Line (text of scroll list)
NR DDMONYY HH:MM	4. Line (value and possible unit of the value)

Button "More>>":

By clicking on the button “More>>” you can open a dialog for the definition of the remaining addresses (up to 40).

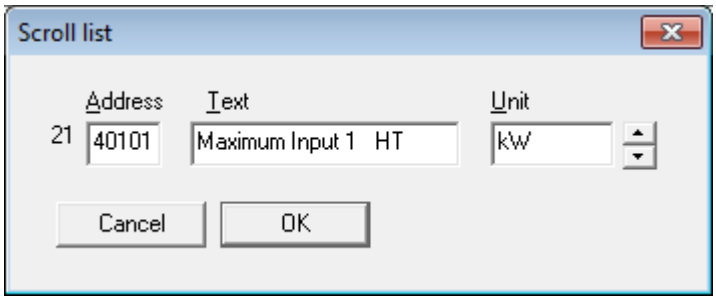
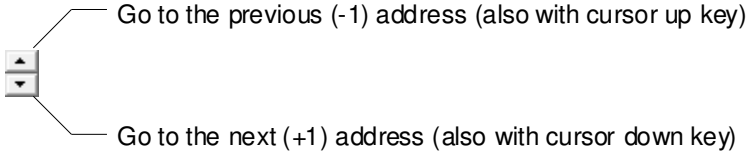


Figure 31, Button "More>>"

Address 21-40:

Click on the scroll bar (to the right of the field “Unit”) to show each of these addresses. Use the scroll bar as follows:



Register addresses for the scroll list

Explanation of the register address abbreviations and placeholders:

cc	input (counter)	01 = input 1 02 = input 2 … 16 = input 16
t	tariff rate	0 = total (no rate): ► sum of all energy tariff values ► From DLX version 1.04.00 up you can also display maximum demand values without tariff rate (totals; t := 0 to 4 for addresses 3xtxx, 4xtxx and 5xtxx). For cumulated maximum demand: t := 1 to 4 1 = rate 1 2 = rate 2 3 = rate 3 4 = rate 4
pp	positive sum	01 = sum 1 (+/–)
nn	negative sum	02 = sum 2 (+/–) 03 = sum 3 (+/–) 04 = sum 4 (+/–)
m	registration period	1 = period MP1/Tm1 2 = period MP2/Tm2

Current cumulated energy values

Address	Description
10tcc	Current energy value for input (cc) and tariff rate (t)
11tpp	Current energy value for the positive sum (pp) and tariff rate (t)
12tnn	Current energy value for the negative sum (nn) and tariff rate (t)

Current demand values (analogue inputs: version 1.06.00 and up)

Address	Description
13mcc	Current demand value for registration period (m) for input (cc)
136cc	Analogue inputs: instantaneous value, from version 1.06.00 and up
137cc	Analogue inputs: average value for registration period Tm1
138cc	Analogue inputs: average value for registration period Tm2
14mpp	Current demand value for registration period (m) for positive sum (pp)
15mnn	Current demand value for registration period (m) for negative sum (nn)

Demand values for the most recent registration period

Address	Description
16mcc	Demand value for the most recent registration period (m) for input (cc)
17mpp	Demand value for the most recent registration period (m) for positive sum (pp)
18mnn	Demand value for the most recent registration period (m) for negative sum (nn)

Cumulative energy values for the most recent registration period MP1/Tm1

Address	Description
19tcc	Cumulative energy value for the most recent period MP1 for input (cc) and tariff rate (t)
20tpp	Cumulative energy value for the most recent period MP1 for positive sum (pp) and tariff rate (t)
21tnn	Cumulative energy value for the most recent period MP1 for negative sum (nn) and tariff rate (t)

Current energy values for the most recent registration period MP1/Tm1 since last reset

Address	Description
22tcc	Current energy value since last reset for MP1 for input (cc) and tariff rate (t)
23tpp	Current energy value since last reset for MP1 for positive sum (pp) and tariff rate (t)
24tnn	Current energy value since last reset for MP1 for negative sum (nn) and tariff rate (t)

Current energy values since last reset

Address	Description
25tcc	Current energy value since last reset for MP1 for input (cc) and tariff rate (t)
26tpp	Current energy value since last reset for MP1 for positive sum (pp) and tariff rate (t)
27tnn	Current energy value since last reset for MP1 for negative sum (nn) and tariff rate (t)

Maximum demand and timestamp for the current reset period (current maximum), without unit

Address	Description
30tcc [1)]	Maximum demand and timestamp for the current reset period for tariff rate (t) and input (cc)
31tpp [1)]	Maximum demand and timestamp for the current reset period for tariff rate (t) and positive sum (pp)
32tnn [1)]	Maximum demand and timestamp for the current reset period for tariff rate (t) and negative sum (nn)

Maximum demand and timestamp for the last reset, without unit

Address	Description
33tcc [1)]	Maximum demand and timestamp for the last reset for tariff rate (t) and input (cc)
34tpp [1)]	Maximum demand and timestamp for the last reset for tariff rate (t) and positive sum (pp)
35tnn [1)]	Maximum demand and timestamp for the last reset for tariff rate (t) and negative sum (nn)

Cumulated maximum demand for the last reset period
(version 1.05.02 and up)

Address	Description
36tcc	Cumulated maximum demand for the last reset for tariff rate (t) and input (cc)
37tpp	Cumulated maximum demand for the last reset for tariff rate (t) and positive sum (pp)
38tnn	Cumulated maximum demand for the last reset for tariff rate (t) and negative sum (nn)

Maximum demand of the current reset period (current maximum)

Address	Description
40tcc	Maximum demand of the current reset period for tariff rate (t) and input (cc)
41tpp	Maximum demand of the current reset period for tariff rate (t) and positive sum (pp)
42tnn	Maximum demand of the current reset period for tariff rate (t) and negative sum (nn)

Maximum demand of the most recent reset

Address	Description
43tcc	Maximum demand at most recent reset for tariff rate (t) and input (cc)
44tpp	Maximum demand at most recent reset for tariff rate (t) and positive sum (pp)
45tnn	Maximum demand at most recent reset for tariff rate (t) and negative sum (nn)

Cumulated maximum demand for the second last reset period
(version 1.05.02 and up)

Address	Description
46tcc	Cumulated maximum demand for the second last reset for tariff rate (t) and input (cc)
47tpp	Cumulated maximum demand for the second last reset for tariff rate (t) and positive sum (pp)
48tnn	Cumulated maximum demand for the second last reset for tariff rate (t) and negative sum (nn)

Timestamp of the current maximum demand

Address	Description
50tcc	Timestamp for the current maximum demand for tariff rate (t) and input (cc), see address 40tcc
51tpp	Timestamp for the current maximum demand for tariff rate (t) and positive sum (pp), see address 41tpp
52tnn	Timestamp for the current maximum demand for tariff rate (t) and negative sum (nn), see address 42tnn

Timestamp for the maximum demand of the most recent reset

Address	Description
53tcc	Timestamp for the maximum demand of the most recent rest for tariff rate (t) and input (cc), see address 43tcc
54tpp	Timestamp for the maximum demand of the most recent rest for tariff rate (t) and positive sum (pp), see address 44tpp
55tnn	Timestamp for the maximum demand of the most recent rest for tariff rate (t) and negative sum (nn), see address 45tnn

Cumulative energy values at most recent reset

Address	Description
60tcc	Cumulative energy value at most recent reset for tariff rate (t) and input (cc)
61tpp	Cumulative energy value at most recent reset for tariff rate (t) and positive sum (pp)
62tnn	Cumulative energy value at most recent reset for tariff rate (t) and negative sum (nn)

Current energy values at most recent reset

Address	Description
63tcc	Current energy value at most recent reset for tariff rate (t) and input (cc)
64tpp	Current energy value at most recent reset for tariff rate (t) and positive sum (pp)
65tnn	Current energy value at most recent reset for tariff rate (t) and negative sum (nn)

Other register addresses

Address	Description
70001 [1)]	Firmware version
83200 [1)]	Unit identification (16 digits), from version 1.05.06 and up
83201 [1)]	Serial number (6 digits), from version 1.05.06 and up
84000 [1)]	Number and timestamp of the most recent reset

[1)] For these items the display will not show physical units!

6.9 Registration period

Definition of the length of registration periods MP1/Tm1 and MP2/Tm2

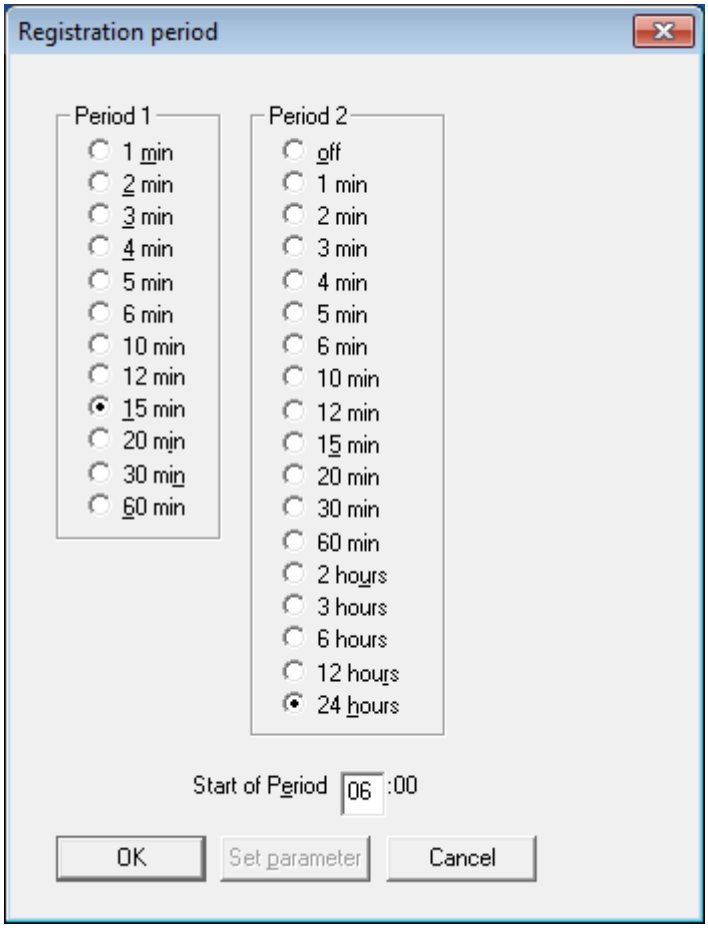


Figure 32, Registration periods

Registration of demand values in the DLX can be done in two registration periods.

Period 1:
Defines the length of registration period MP1/Tm1.
Resets and maximum demand calculation are only done for registration period MP1.

Period 2:
Defines the length of registration period MP2/Tm2.

Start of Period:
Defines the start time of registration period MP2/Tm2 in full hours.

Example: Registration period 2 (MP2/Tm2) = 24 hours
Start of period = 06:00 (for CET = Central European Time: wintertime)
The calculation of values for registration period MP2/Tm2 starts at 06:00 for the next 24 hours.

- **This item can only be selected of registration period 2 (Tm2) is set to 24 hours.**

6.10 Tariff calendar

➢ **You must select the item "Internal tariff calendar" in the dialog "Control in-/outputs ▸ Tariff control" to activate the internal tariff rate calendar.**

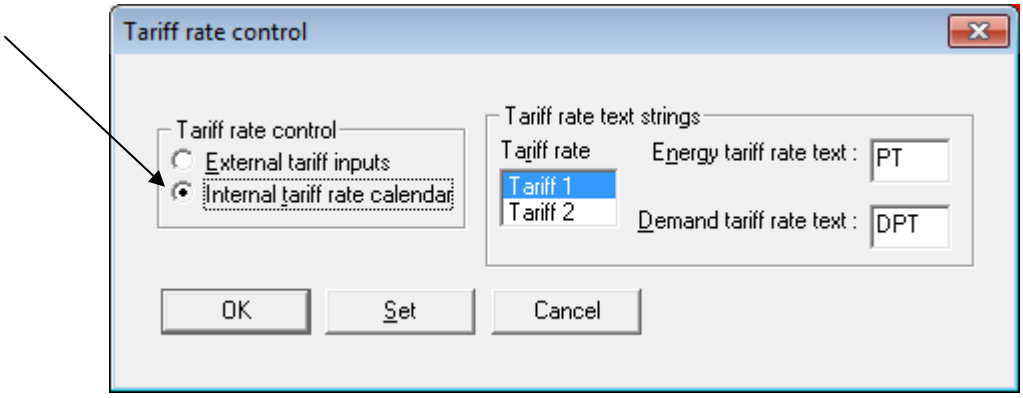


Figure 33, Tariff rate control

You can use the dialog "Tariff calendar" to define the device internal switching times for the various tariff rates. This dialog allows you to create a number of different rate tables for different periods of time (e.g. summertime and wintertime) for one whole year.

The following example is used to illustrate the usage:

Example Two different seasons (wintertime and summertime) with different switching times for two energy rates and two demand rates (Peak time "PT" and Normal time "NT").

The following settings (switching times) are used:

Peak time "PT"

Season:	Summertime	Wintertime
Time period:	April 01 (00:00) to November 01 (00:00)	November 01 (00:00) to April 01 (00:00)
MO – FR (PT):	06:00 – 21:00	06:00 - 18:00
SA (PT):	06:00 – 13:00	06:00 - 13:00

Normal time "NT"

All other time periods (incl. Sundays and public holidays)

Public holidays

Holiday type 1:	Tariff rate structure like Sunday (Normal time "NT" only): 01.01.2011 (New Year's Day), 22.04.2011 (Easter Friday), 25.04.2011 (Easter Monday), 01.05.2011 (Labor Day), 02.06.2011 (Resurrection of Christ), 13.06.2011 (Whitsun Monday), 25./26.12.2011 (Christmas Day and Boxing Day).
Holiday type 2:	Tariff rate structure like Saturday (Peak time "PT" from 06:00 to 13:00): 24.12.2011 (Christmas Eve), 31.12.2011 (New Year's Eve).

For these tariff settings 4 daily rate tables are required:

Rate table 1	Rate table 2	Rate table 3	Rate table 4
MO-FR (summertime)	MO-FR (wintertime)	SO holiday type 1	SA holiday type 2
PT 06:00 - 21:00	PT 06:00 - 18:00	NT 00:00 - 00:00	PT 06:00 - 13:00
NT 21:00 - 06:00	NT 18:00 - 06:00		NT 13:00 - 06:00

These settings can also be put into different tables with a slightly bigger effort in the table definition:

Rate table 1	Rate table 2	Rate table 3	Rate table 4
MO-FR (summertime)	MO-FR (wintertime)	SO holiday type 1	SA holiday type 2
NT 00:00 - 06:00	NT 00:00 - 06:00	NT 00:00 - 00:00	NT 00:00 - 06:00
PT 06:00 - 21:00	PT 06:00 - 18:00		PT 06:00 - 13:00
NT 21:00 - 00:00	NT 18:00 - 00:00		NT 13:00 - 00:00

The following example only shows the steps required for the first set of tables.

6.10.1 Tariff calendar configuration

Definition of the number of seasons (max. 6) and the type of daily rate tables (max. 4).

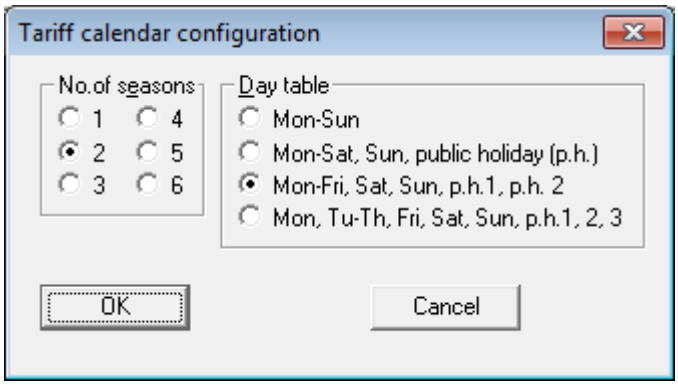


Figure 34, Tariff calendar configuration

You can use this dialog to adjust the number of required seasons and to define the basic structure of the daily tariff rate tables. You can use up to 6 seasons and you can choose from 4 different daily rate tables.
For our example we require 2 seasons and the daily rate table structure named “Mon-Fri, Sat, Sun, p.h.1 (public holidays 1), p.h.2 (public holidays 2)”.

6.10.2 Tariff calendar definition

6.10.2.1 Daily rate tables

For our example we require 4 different daily rate tables.

In order to define these daily rate tables you select the menu item “Tariff calendar” from the menu item “Tariff”. Then click on the button 

(Day table) to open the dialog for the definition of the daily rate tables.
You can define up to max. 15 different daily rate tables, each with up to 8 different switching times for the various rates.

➢ **The range of selectable energy and demand tariff rates depends on the number of rates defined in the dialog “Number of …“, see page 29.**

Entering the first daily rate table (Day table 1):

A daily rate table can consist of a number of rate settings and it always spans a period of 24 hours.

Definition of daily rates:
06:00 to 21:00 PT (energy peak time) and DPT (demand peak time)
21:00 until end (06:00) NT (energy normal time) and DNT (demand normal time)

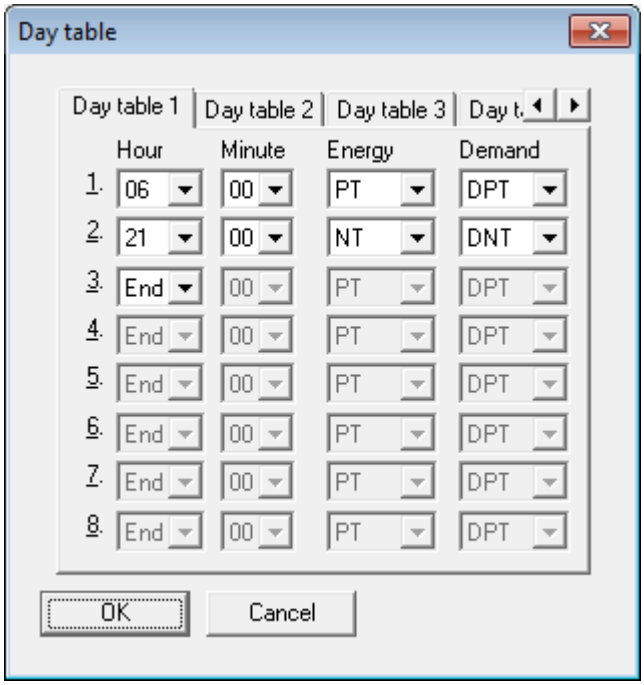


Figure 35, Daily rate tables: rate table 1

Select the tab “Day table 1” to define the daily rates.

1. Select the first daily rate switching time (in hours and minutes): in our example the first switching of rates occurs at 06:00.
2. Select the energy and demand rates that must be activated: in our example the peak time rates for energy (PT) and demand (DPT) shall be activated at 06:00.
3. Select the second daily rate switching time (in hours and minutes, this is also the stop time for the first set of daily rates): in our example the second switching of rates occurs at 21:00.
4. Select the energy and demand rates that must be activated for the second daily rate zone: in our example the normal time rates for energy (NT) and demand (DNT) shall be active from 21:00 to 06:00.
   The first daily rate table is now complete.

- **If no further rate changes have been programmed, then the rates last activated stay active until the next rate change happens (in our example at 06:00 on the next day). If the change to a new day activates a new daily rate table, then the relevant rates for that table will be used from 00:00.**
- **Switching times must be entered in ascending order.**

Entering the remaining daily rate tables:

The remaining daily rate tables are programmed accordingly (same pattern of actions as for the first daily rate table).

Please make sure that you first select the correct tab.

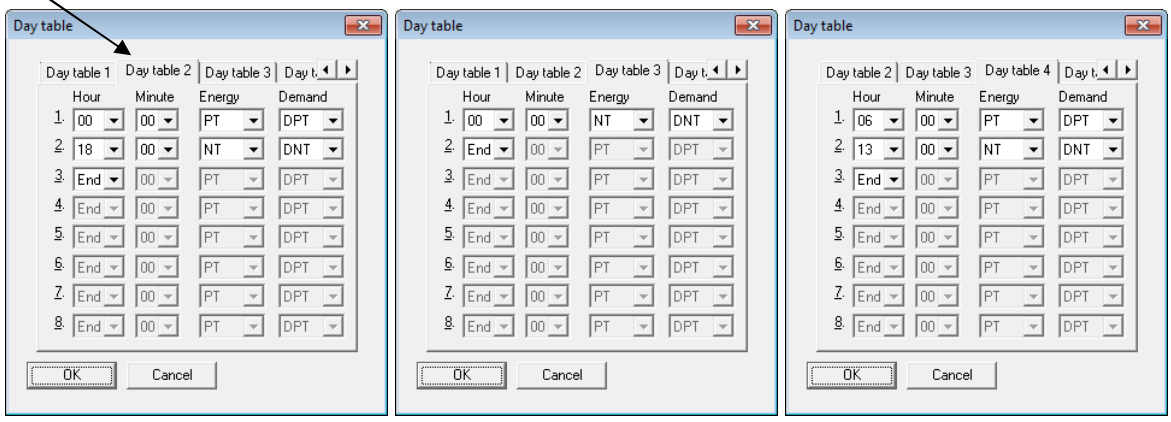


Figure 36, Daily rate table 2-4

6.10.2.2 Definition of seasons

- **If, like in our example, more than one season is used, then you must make sure that the season spanning beyond the end of a calendar year is programmed as the last season.**

Entering the first season

Definition of season 1 (summertime):

Start: April 01, 00:00:00

Stop: November 01, 00:00:00

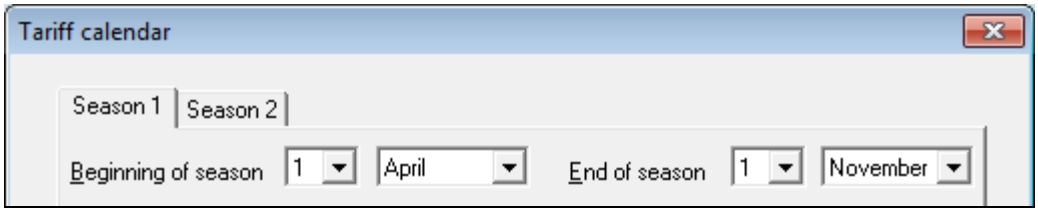


Figure 37, Season definition: Season 1

1. Set the value for the first day of the season (day and month) in the fields next to “Beginning of season”.
2. Set the values for the first day of the next season (day and month) in the fields next to “End of season” (the time will be set automatically to 00:00:00).
3. The second season will now be defined automatically by the programming software. The display for season 2 only shows the start date (November 01). This season stays active until the beginning of the next season (in our example on April 01).

Display for season 2 (wintertime):

Start: November 01, 00:00:00

Stop: 1 - - - (automatic detection)

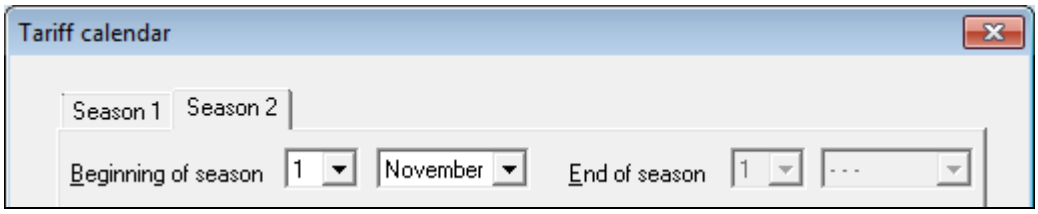


Figure 38, Season definition: Season 2

6.10.2.3 Allocation of daily rate tables to seasons

Once all the daily rate tables and the seasons are defined you can allocate daily rate tables to season.

Season 1: daily rate table for Mon-Fri

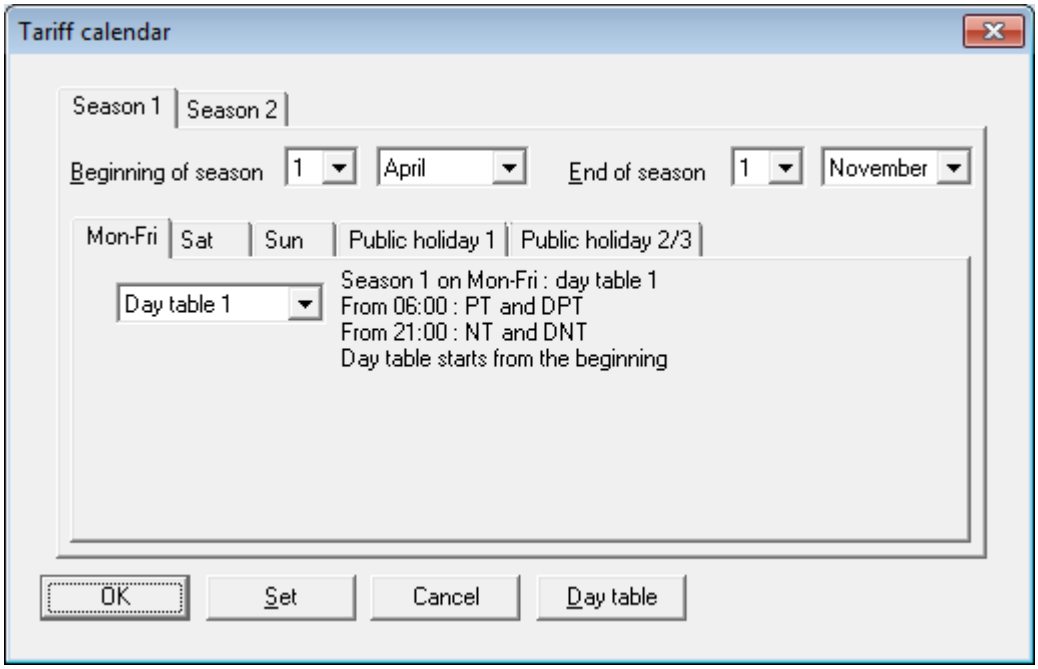


Figure 39, Allocation of daily rate tables for season 1: Mon-Fri

1. Select the tab “Season 1” (summertime: April 01 to November 01).
2. Select the tab “Mon-Fri” and then select the “Day table 1” from the list box.
   For control purposes you can now see the settings for the selected daily rate table to the right hand side of the list box.
3. Now allocate the correct daily rate tables in the tabs “Sat”, “Sun”, “Public holiday 1” and “Public holiday 2/3” by using the same method as described under 1) and 2).

Season 1: daily rate table for Sat

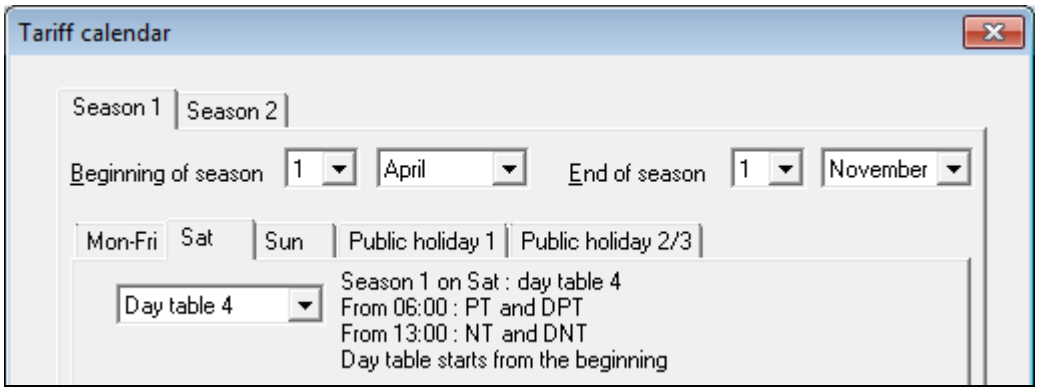


Figure 40, Allocation of the daily rate table for season 1: Sat

Season 1: daily rate table for Sun

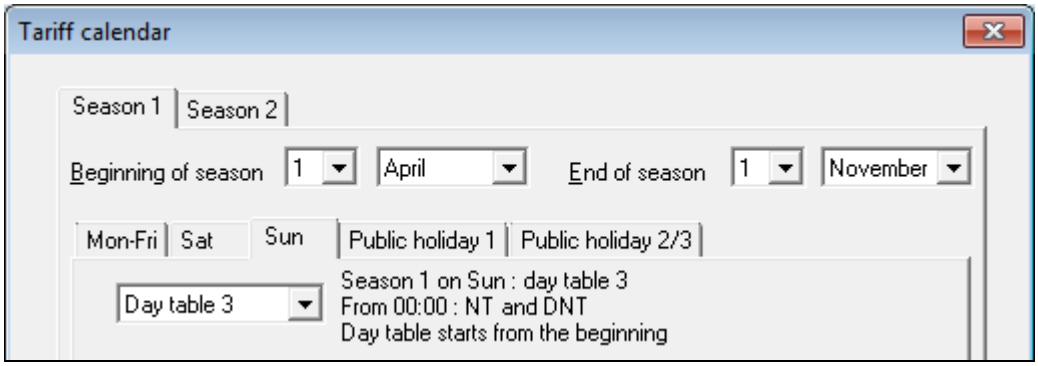


Figure 41, Allocation of the daily rate table for season 1: Son

Use the same method to allocate the daily rate tables for season 2.

Season 2: daily rate table for Mon-Fri

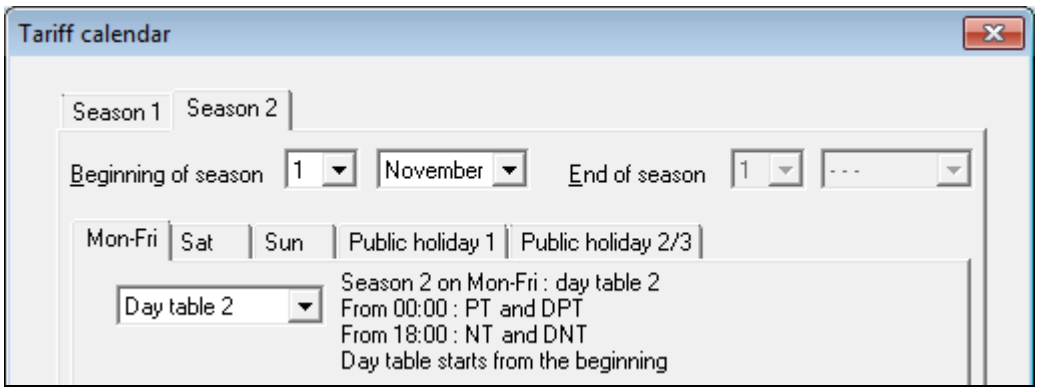


Figure 42, Allocation of the daily rate table for season 2: Mon-Fri

6.10.3 Definition of public holidays

Select the menu item “Tariff calendar – public holidays” to open the dialog for public holiday definition. You can define up to 100 public holidays.

- Fixed holidays, which occur on the same day in every year, can be defined by using the wildcard character “********”
  (examples: New Year’s Day: ******-01-01** or Christmas Day: ******-12-25**).

Definition of public holidays:

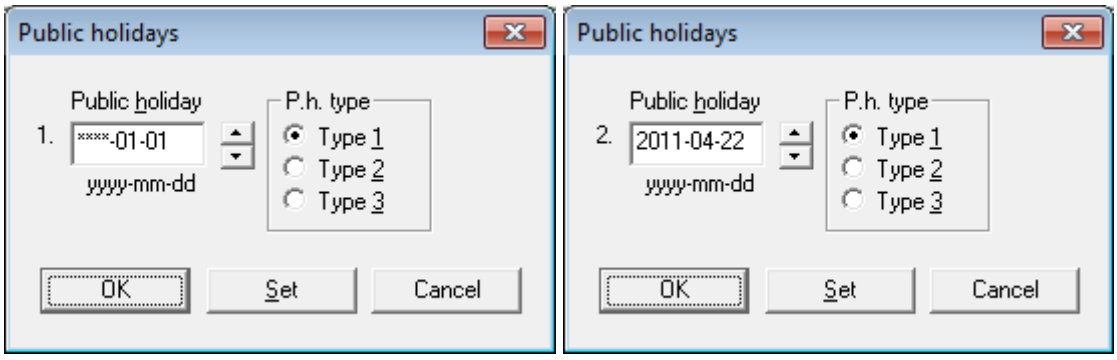


Figure 43, Public holidays for the tariff calendar

Use the scroll buttons to select holiday number “1” (the number is displayed to the left of the input field) and then use the numeric keys to enter the date for the first public holiday (****-01-01, New Year’s Day). Please note the date format:

YYYY-MM-DD:
Year (four digits) - **Month** (two digits) - **Day** (two digits)! Do not forget the dashes!

Now select the holiday type for this holiday (in our example New Year’s Day is defined to be as a public holiday of type 1).

Input of the remaining public holidays:

Use the same method as described above to define the remaining public holidays, but ensure that you always first select a new holiday number for each public holiday.

6.11 Communication

6.11.1 Transmission settings

Define the parameters for transmissions

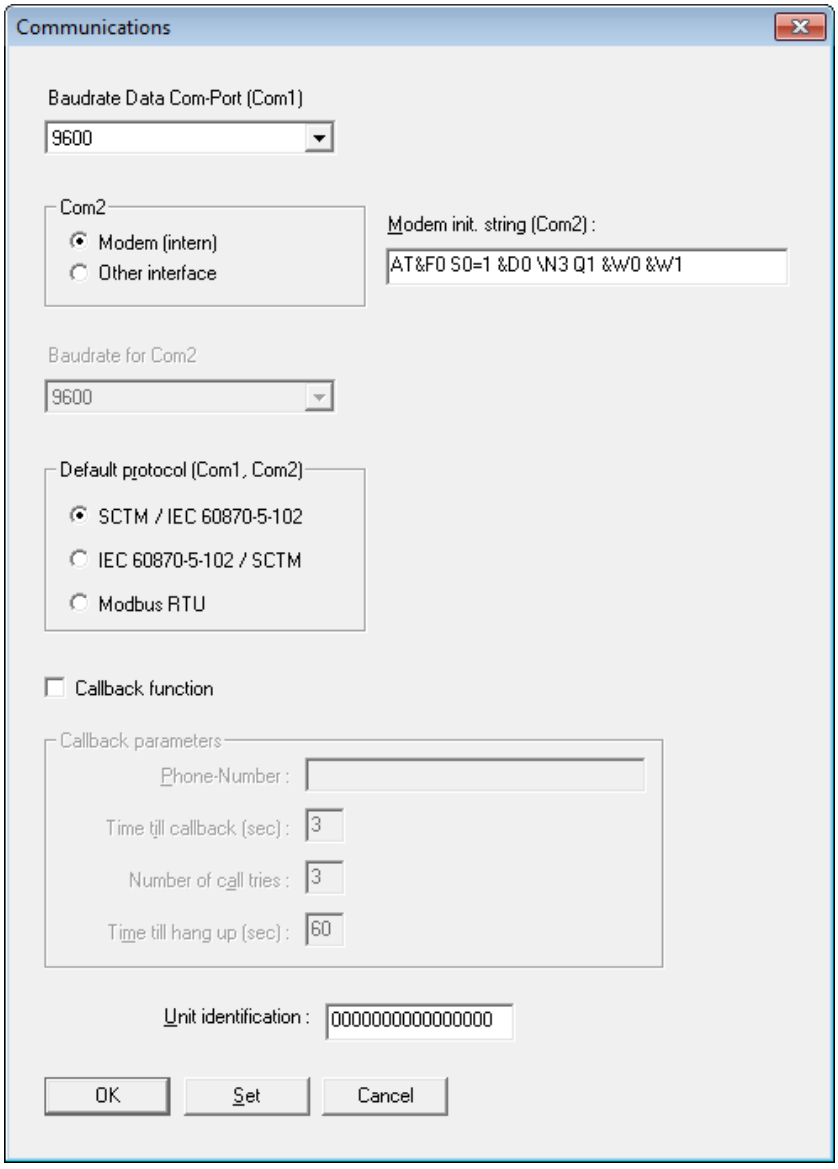


Figure 44, Transmission settings

Baud rate for Data Com-Port (Com1):

Select the transmission speed for the data interface (Com1).

- **The baud rate for the service interface is fixed at 9600 Baud, the modem recognizes the baud rate automatically.**

Com2:

If the modem is replaced with another (optional) interface (e.g. RS232, RS485, fiber optic interface, 20mA/CL/CS or M-Bus) then a relevant text string must be entered here, such as "**D2400**" or "**D4800**"or "**D9600**"… It happens automatically by clicking of "**Baud rate for Com2**";

Modem init. string (Com2):

String for the initialization of the modem (set of AT commands starting with AT) or the modem replacement interface (Modem init string: direct control string).

The DLX can be equipped with one of the following modem types:

- PSTN
- ISDN
- ETH (Ethernet / LAN-Interface)

You can find more information about the AT command set in the user manual of the modem.

PSTN: Default settings for analogue modems:

• &F0	load factory settings set 0
• S0=1	wait for 1 ring before responding
• &D0	ignore DTR
• \N3	auto reliable mode with error correction according to V.42/MNP4 and data compression according to V.42bis/MNP5 normal mode, no error correction
alternative:	\N0 no error correction
• Q1	do not output status codes
• &W0 &W1	store user settings in non-volatile memory

The modem will respond to an incoming call after one ring (S0=1). The transmission speed between the two modems will be adjusted automatically (\N3 or \N0).

➢ **The default modem string is designed for use in most applications. If the modem used at your PC is of an older type and does not have error correction capability, it is recommended to use the setting \N0 (normal mode, no error correction), as this will shorten the time to establish a connection. The modem initialization string should only be changed in exception cases because any change can have the effect that the DLX cannot be read via the modem interface any more.**

ISDN: ISDN modems are factory programmed at delivery:

- S0=1 Respond after one ring
- &D0 Ignore DTR
- B10 B-Chanel Protocol X.75-NL
- **BSIZE=512 Block size 512 Byte
- **MSN=* MSN non active
- Q1 No feedback messages
- &W Save user settings in non-volatile memory

The programming must be finalized on location performing the following instructions:

Note: **It is important to do the programming steps in correct order !**

1. Default value: Enter "**ATZ**" as Modem init string and use the Set button to send it to DLX.

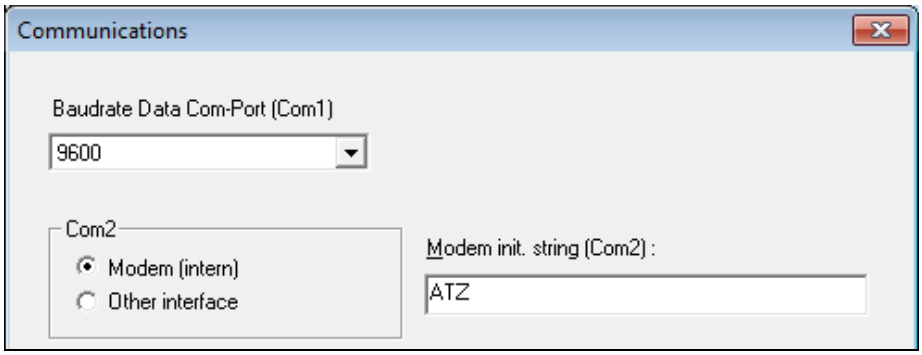


Figure 45, Communication parameter: ISDN

Note: **Don't send now an "AT&W" or "AT&F" command to the modem !** This will save probably wrong settings permanently in the modem. In case of failure the modem must be sent to manufacturer for correction.

2. Turn off DLX and after some seconds on again. Now you can set the MSN number, if necessary . To do this enter "**AT**MSN=xxx**" into the "Modem init string (Com2)" field and send it to DLX using the Set button.

Figure 46, Communication parameter: ISDN MSN-Number

This value is recommendable for default.

3. You can disable an MSN number using the modem init string "**AT**MSN=***" and sending it to DLX (use the Set button).

4. Some other commands to be optionally sent to DLX:

   "**AT&W**" + Set : Save current configuration as default.

   "**ATZ**" + Set : Perform software reset and load default settings.

Note: Use for default "**ATZ**" or "**AT**MSN=xxx**".

ETH (LAN): LAN connections are factory programmed at delivery:

- S0=1 Respond after one ring
- &D0 Ignore DTR
- T TCP/IP-Mode
- #PORT=1234 Port: 1234
- #DTC=60 Data Transmit Control (60 seconds)
- #GW=0.0.0.0 Gateway: 000.000.000.000
- #NM=255.255.255.0 Net-Mask: 255.255.255.000 (FF.FF.FF.00)
- #IP=0.0.0.0 IP-Address
- Q1 No feedback messages
- &W Save user settings in non-volatile memory

The programming must be finalized on location performing the following instructions:

Note: **It is important to do the programming steps in correct order !**

A: Sure / complex method:

1. Default value: First enter "**AT**" into the field "Modem init string (Com2)" and send it to DLX using the Set button.

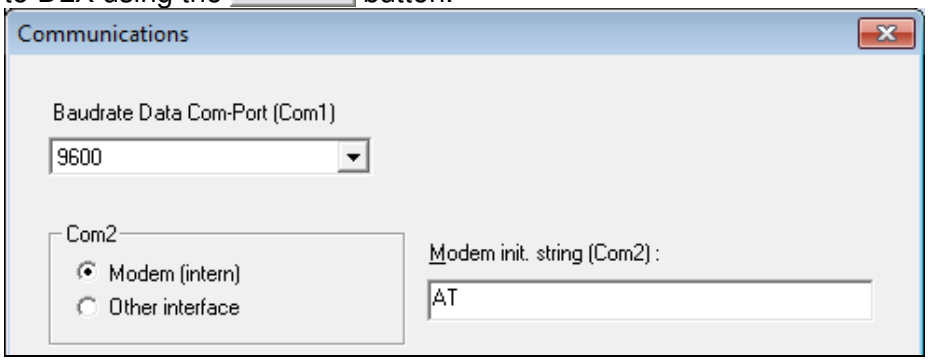


Figure 47, Communication parameter: ETH

Note: **Don't send now an "AT&W" or "AT&F" command to the modem !** This will save probably wrong settings permanently in the modem. In case of failure the modem must be sent to manufacturer for correction.

2. Turn off DLX and after some seconds on again. Now you can set IP-Address used for the DLX. To do this enter "**AT#IP=xxx.xxx.xxx.xxx**" into the „Modem init string (Com2)" field and send it using the Set button. Example: IP=192.168.1.101

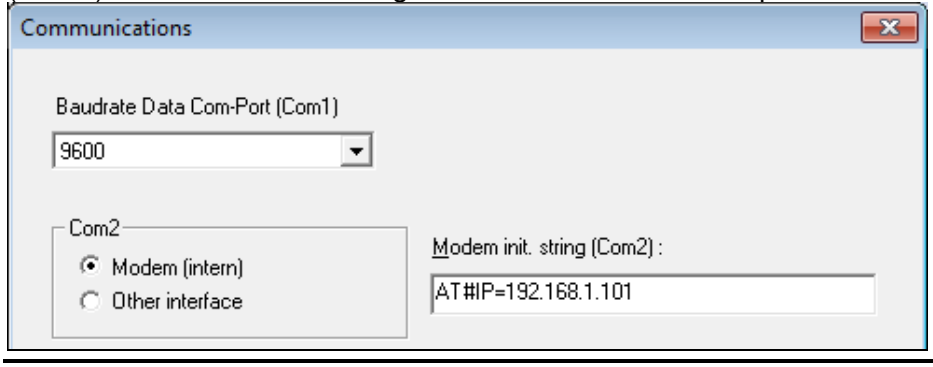


Figure 48, Communication parameter: ETH IP-Address

3. Optional settings (send following commands to the DLX):

   new port number: "**AT#PORT=yyyyy**" + Set, with yyyyy: new port number, (default: the TCP/IP connection uses the port number 1234)

   new gateway: "**AT#GW=xxx.xxx.xxx.xxx**" + Set

   new net-mask: "**AT#NM=xxx.xxx.xxx.xxx**" + Set

   TCP/IP keep-alive value: "**AT#KEEP=10**" + Set

4. Default value: finally send an “AT” command to DLX: "**AT**" + Set

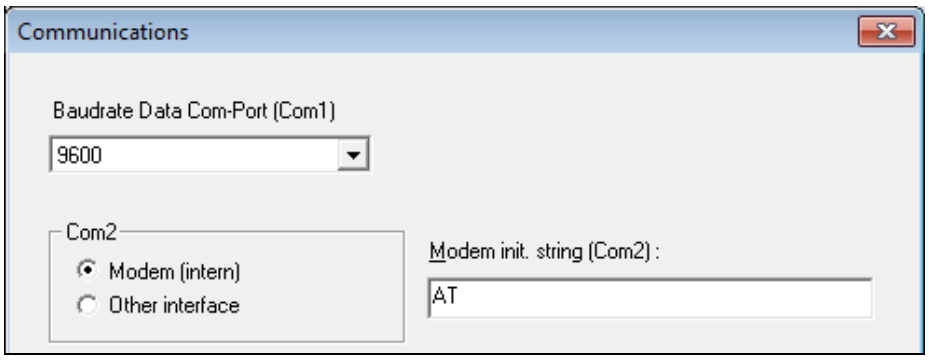


Figure 49, Communication parameter: ETH default value

5. **Important: Turn DLX off and after some seconds on again. This causes all settings to be enabled.**

Note: Use for default "AT".

B: Fast method:

Set IP-Address used for the DLX. To do this enter "**AT#IP=xxx.xxx.xxx.xxx**" into the “Modem init. string (Com2)” field and send it using the Set button.

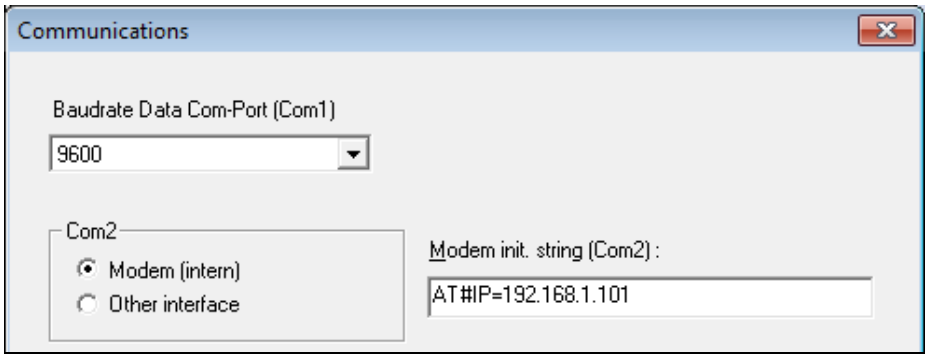


Figure 50, Communication parameter: ETH IP-Address

Turn DLX off and after some seconds on again. This causes all settings to be enabled.

Default protocol (Com1, Com2):

Select the desired transmission protocol for the data interface. The device automatically detects the protocol used by the control center (for SCTM and IEC only). It always interprets the first telegram in the default protocol. If it cannot interpret the first telegram correctly, the DLX switches the interface to the other protocol. As a consequence the first telegram is lost and needs to be repeated by the control center. After a time period of 5 minutes without any telegram transmissions, the interface will be automatically switched back to the default protocol.

SCTM / IEC 60870-5-102:	selects at first the SCTM protocol (7,even,1: 7E1), after that IEC
IEC 60870-5-102 / SCTM:	selects at first the IEC protocol (8,even,1: 8E1), after that SCTM
Modbus RTU:	selects on both interfaces (Com1 and Com2) the Modbus protocol only (8,none,1: 8N1)

Callback function (possible for PSTN modem only !):

The callback functionality causes the DLX to terminate every incoming call immediately and after that call a previously programmed telephone number. This call then must be accepted by a suitable management software (e.g. AMR) which can read data from the DLX.

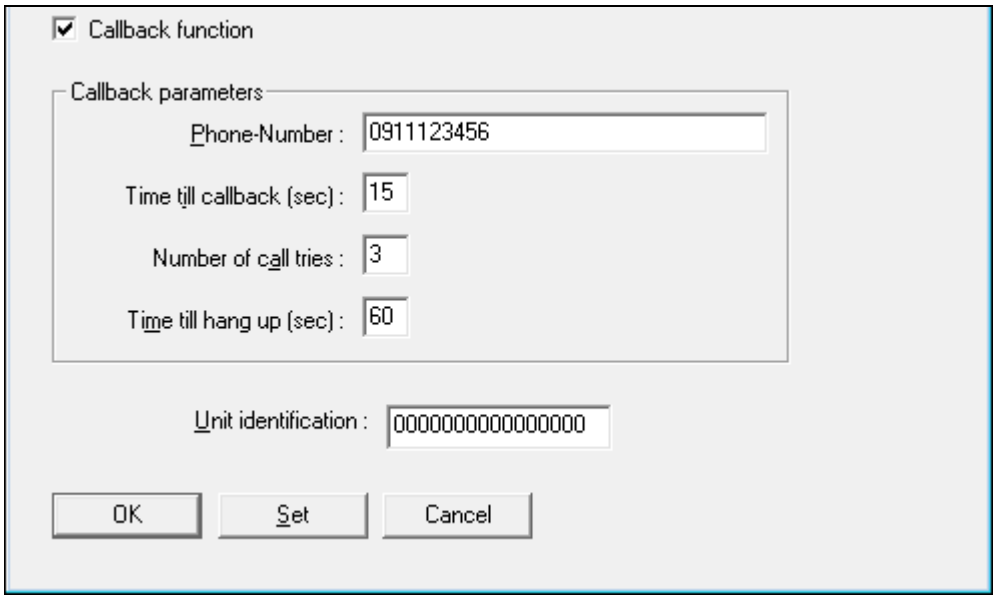


Figure 51, Communication parameter: Callback function

Phone-Number:
Phone number to be called by DLX callback.

Time till callback (sec):
Pause between a call and the following callback.

Number of call tries:
Number of tries to establish a connection to management software. On failure an alarm is generated.

Time till hang up (sec):
Maximum time between the incoming call and establishing an (outgoing) connection to management software. If this time expires the DLX will hang up.

If an analogue modem is used this parameter must be at least “time to callback” plus 30 seconds.

Note: It is important to set following parameter in the “Modem init. string”: &D2 &S1 %B0

Overview:

&D2: internal DTR line on/off transition causes the modem to hang up
&S1: internal DSR line on after a response tone has been detected
%B0: each character on the internal TxD line will result in an interruption of the connection setup

Unit identification:
Enter the internal unit identification number with the numeric keys. The internal unit identification number must have 16 digits.

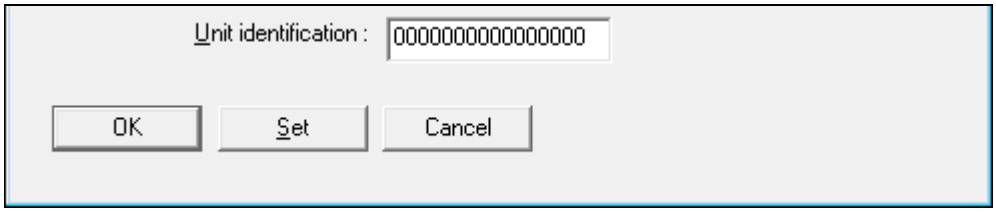


Figure 52, Communication parameter: Unit ID

6.11.2 SCTM protocol

Defining the communication parameters for the SCTM protocol.

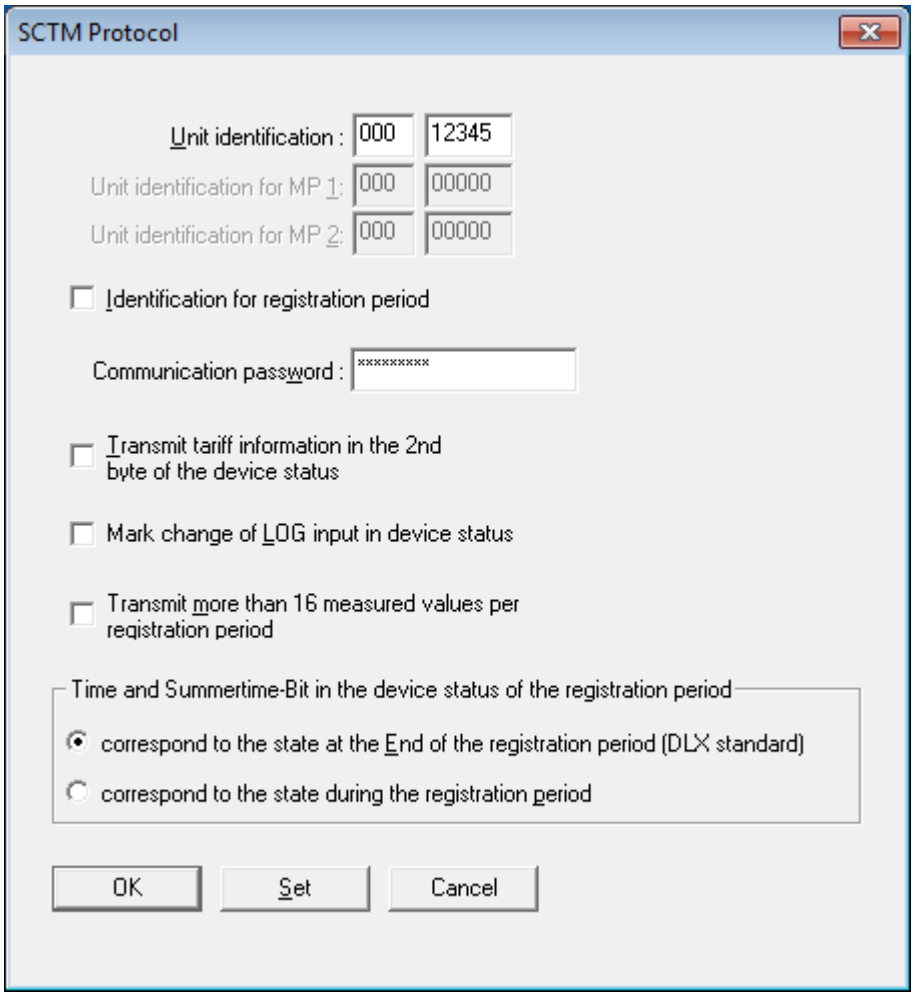


Figure 53, Communication: SCTM protocol

Unit identification:
Enter the unit identification number for SCTM transmissions (5 or 8 digits). If the first three digits of an 8-digit unit identification number are „000“ then the DLX will answer on both the 8-digit number (e.g. 00012345) and the resulting 5-digit number (e.g. 12345).

Unit identification for MP1:
Enter an additional unit identifier for the registration period MP1/Tm1.

Unit identification for MP2:
Enter an additional unit identifier for the registration period MP2/Tm2.

- Using the unit identification of the DLX, all information can be retrieved (MP1/Tm1, MP2/Tm2 and S51/spontaneous events buffer), using the “unit identification for MP1” only data for registration period MP1/Tm1 can be retrieved (and respectively for “unit identification for MP2”).

Identification for registration period:
Activates the unit identifiers for MP1 and MP2.

Communication password:

Using a communication password adds an additional level of security. If enabled this password must be sent by management software at every SCTM communication request.

Note: The communication password must be either cleared (disabled) or exactly 9 characters long. Otherwise an error message will be displayed:

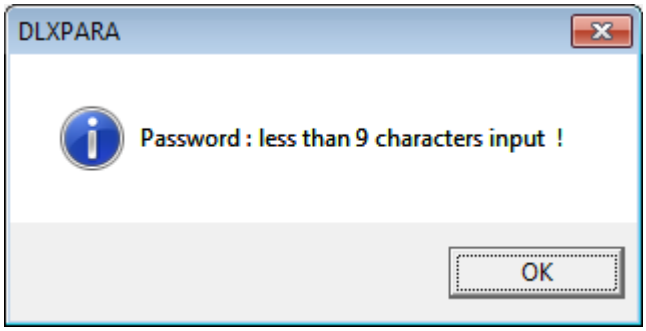


Figure 54, Communication: SCTM protocol wrong password

Transmit tariff information:

If this checkbox is marked, the DLX sends the tariff information byte in the device status byte 2 during SCTM transmissions.

Mark change of LOG input:

If this checkbox is marked, all signal changes of the logic inputs (Log1 to Log4) will be saved in the device status byte 2 and sent during SCTM transmissions.

Transmit more than 16 values per registration period:

If this checkbox is not marked (standard), only up to 16 register or counter values can be transmitted per registration period.

Time and Summertime-Bit in the device status:

When the summertime switch happens the device can transmit either the current time (setting „DLX standard“):

Example: Time - Device status
01:30 - 0040
01:45 - 0040
03:00 - 8840
03:15 - 0840

or alternatively the state during the registration period (setting “correspond to the state during the registration period”):

Example: 01:30 - 0040
01:45 - 0040
02:00 - 8040
03:15 - 0840

6.11.3 IEC 60870-5-102 protocol

Define the communication parameters for the IEC 60870-5-102 protocol.

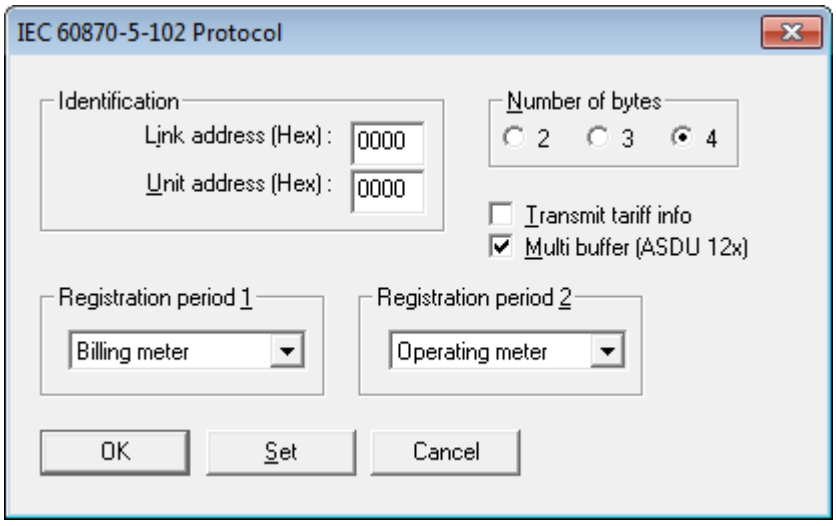


Figure 55, Communication: IEC 60870-5-102 protocol

Identification:

Parameters for data retrieval, all values in hexadecimal notation (0000 to $FFFF_{hex}$)

Link address: device address, length: 2 bytes.

Unit address: In addition to the link address a counter register address (ASDU address) can be assigned, length: 2 Byte. This address is transmitted automatically by the unit during queries for the most recent measurement values and spontaneous events. During subsequent queries of registration period data this address must be set correctly at the control center.

Number of bytes:

Defines the number of bytes transmitted for each value during data retrieval. Measured values are always aligned to the right for transmission.

Transmit tariff info:

Tariff information is sent during data retrieval.

Multi buffer (ASDU 12x):

This setting allows data retrieval using ASDU 120 to123.

Registration period 1 / 2:

Billing meter: Registered values are transmitted as billing data (with checksum).

Operating meter: Registered data is transmitted for checking purposes only and is not relevant for billing purposes (without checksum).

6.11.4 Modbus RTU protocol

Define the communication parameters for the Modbus RTU (Remote Terminal Unit) protocol.

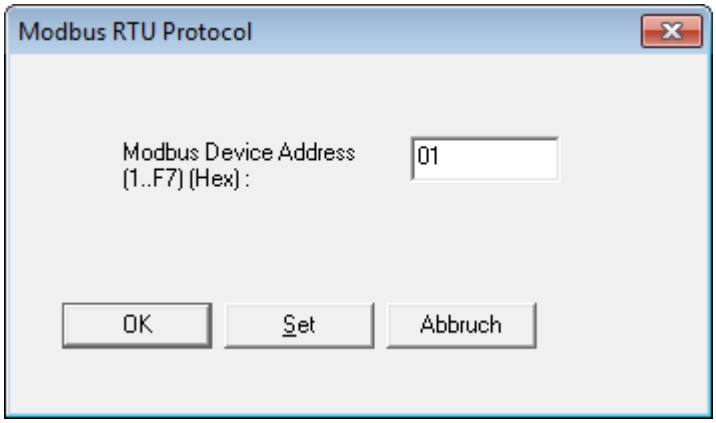


Figure 56, Communication: Modbus RTU protocol

Modbus Device Address (Hex): length: 1 byte, hexadecimal,
value range: 1 to F7 (hex); (:= 1 to 247)

6.12 Periodic buffer

6.12.1 Buffer options

Define the periodic buffer (load profile) options

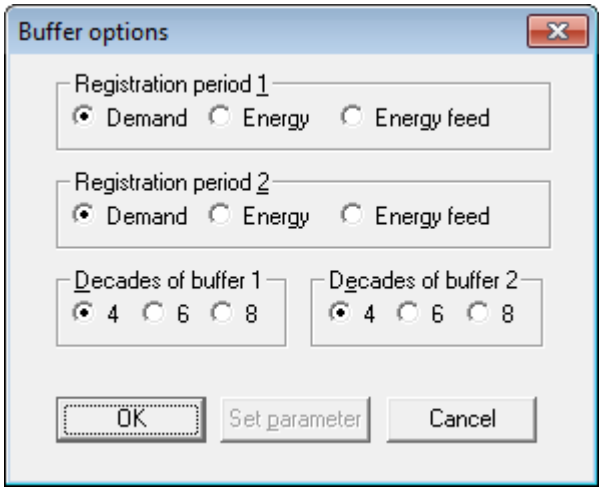


Figure 57, Options for periodic buffers (load profiles)

Registration period 1:

Select the type of values to be stored and transmitted for periodic buffer MP1/Tm1. The following options exist:

Demand: demand values are stored and transmitted (e.g. kW);

Energy: cumulative energy values are stored and transmitted (e.g. kWh);

Energy feed: the energy increments (the amount of energy since the end of the last registration period) are stored and transmitted (e.g. kWh);

➢ **Only one option is possible per buffer, i.e. all saved values are either of type demand or energy or energy feed.**

Registration period 2:

Select the type of values to be stored and transmitted for periodic buffer MP2/Tm2: see options for “registration period 1”.

Decades of buffer 1:

Select the length (number of digits) of values stored and transmitted for registration period MP1 (one decade = one digit) During roll-overs the most significant digits will be erased and the corresponding error bit will be set in the data status.

The following table shows some examples of storage and transmission of registered values, depending on the number of selected decades.

Registered value	Decades	Stored and transmitted value	Value shown in the DLX-Display
1 2 3 4	4	1 2 3 4	0 0 0 0 1 2 3 4
1 2 3 4	6	0 0 1 2 3 4	0 0 0 0 1 2 3 4
1 2 3 4	8	0 0 0 0 1 2 3 4	0 0 0 0 1 2 3 4
1 2 3 4 5 6	4	3 4 5 6	F F F F 3 4 5 6
1 2 3 4 5 6	6	1 2 3 4 5 6	0 0 1 2 3 4 5 6
1 2 3 4 5 6	8	0 0 1 2 3 4 5 6	0 0 1 2 3 4 5 6
1 2 3 4 5 6 7 8	4	5 6 7 8	F F F F 5 6 7 8
1 2 3 4 5 6 7 8	6	3 4 5 6 7 8	F F 3 4 5 6 7 8
1 2 3 4 5 6 7 8	8	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8

F: Error: some digits of value are deleted

Decades of buffer 2:

Select the length (number of digits) of values stored and transmitted for registration period MP2 (see decades for buffer 1).

6.12.2 Periodic buffer 1

Definition of the values (inputs, sums, apparent demand and cosine phi (φ)) stored in periodic buffer (load profile) 1.

As the dialog windows for “Periodic buffer 1” and “Periodic buffer 2” are identical in design, only the dialog window for “Periodic buffer 1” is described!

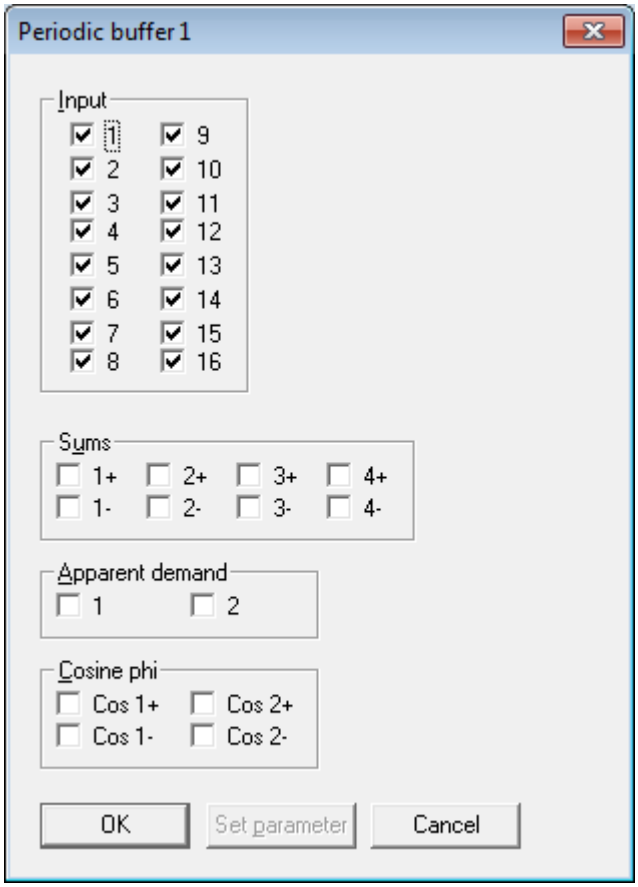


Figure 58, Periodic buffer 1

- **Demand values, energy values or energy increments relevant for billing purposes (see menu item “Buffer options” under “Periodic buffer”) can be stored and transmitted via the data interface or the modem (using SCTM protocol or IEC 60870-5-102 protocol) in two load profile buffers (for registration periods MP1 and MP2).**

  Input:
  Select the inputs that must be stored in the selected periodic buffer MP1/Tm1 or MP2/Tm2.

  Sums:
  Select the summation units that must be stored in the selected periodic buffer MP1/Tm1 or MP2/Tm2.

Apparent demand:

Select the apparent demand registers that must be stored in the selected periodic buffer MP1/Tm1 or MP2/Tm2.

Cosine phi:

Select the cosine phi (φ) registers that must be stored in the selected periodic buffer MP1/Tm1 or MP2/Tm2. The DLX will always store the first three digits to the right of the decimal point (in rounded form) for cosine phi (φ) values. The following table shows some examples of rounding, storage and transmission for the cosine values.

Cosine (φ)	Decades	Value stored and transmitted	Value shown in the DLX display
0.9987	4	0 9 9 9	0 0 0 0 0 9 9 9
0.9987	6	0 0 0 9 9 9	0 0 0 0 0 9 9 9
0.9987	8	0 0 0 0 0 9 9 9	0 0 0 0 0 9 9 9
1.000	4	1 0 0 0	0 0 0 0 1 0 0 0
1.000	6	0 0 1 0 0 0	0 0 0 0 1 0 0 0
1.000	8	0 0 0 0 1 0 0 0	0 0 0 0 1 0 0 0
0.03	4	0 0 3 0	0 0 0 0 0 0 3 0
0.03	6	0 0 0 0 3 0	0 0 0 0 0 0 3 0
0.03	8	0 0 0 0 0 0 3 0	0 0 0 0 0 0 3 0

6.12.3 Periodic buffer 2

See “Periodic buffer 1”.

6.13 Memory

Define and display the memory capacity for the PC-Card and the internal registration period storage

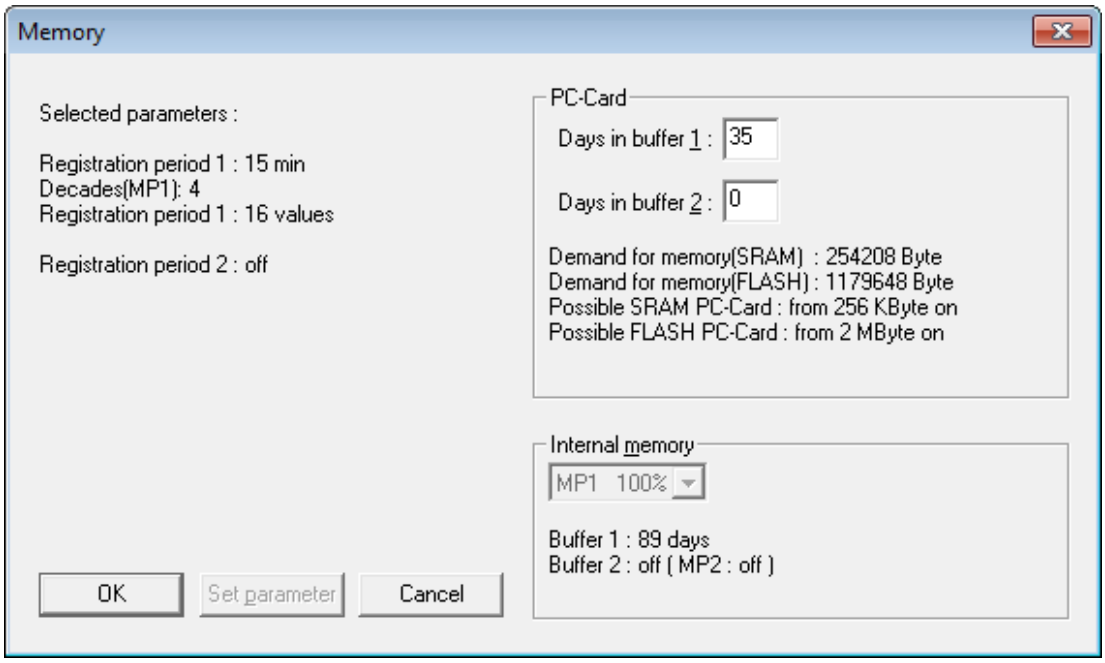


Figure 59, Memory

PC-Card:

Select the number of days stored in periodic buffer 1 (MP1/Tm1) and in periodic buffer 2 (MP2/Tm2).

Depending on the settings selected a minimum size of PC-Card will be recommended for two possible options:

- SRAM PC-card (buffered by a battery)
- FLASH PC-card

FLASH PC-Cards usually require a higher capacity due to the technology, which forces a storage method with higher usage of memory.

Internal memory:

In the case of two active registration periods the internal memory can divided into two areas. The following settings are possible:

	Minimum area size in Kbytes	
	MP1/Tm1	MP2/Tm2
MP1 89%	512 Kbytes	64 Kbytes
MP1 78%	448 Kbytes	128 Kbytes
MP1 67%	384 Kbytes	192 Kbytes
MP1 56%	320 Kbytes	256 Kbytes
MP1 44%	256 Kbytes	320 Kbytes
MP1 33%	192 Kbytes	384 Kbytes
MP1 22%	128 Kbytes	448 Kbytes
MP1 11%	64 Kbytes	512 Kbytes

From these settings the software calculates the corresponding storage capacity in days and displays it on the screen.

Measuring period MP1/Tm1	$\frac{\text{Sectors in Tm1} \times 65522}{12 + (\text{Bytes in Tm1} \times \text{Entries in Tm1})}$ min.
Measuring period MP2/Tm2	$\frac{\text{Sectors in Tm2} \times 65522}{12 + \text{Bytes in Tm2} \times \text{Entries in Tm2})}$ min.

where:

Bytes in Tm1/2:
4: for 4 stored decades
6: for 6 or 8 stored decades

Sectors in Tm1/2:
Round (memory share for Tm1/2 x 9)
(depends on the settings for the division of internal memory in DLXPARA) e.g.: share for MP1 = 56%
→ Sectors in Tm1 = 5.

Entries in Tm1/2:
1 to 32
(depends on the number of inputs, sums, apparent demand registers and cosine phi (φ) register selected for the registration period / load profile)

6.14 Extra (device language)

Select the language (for the DLX display)

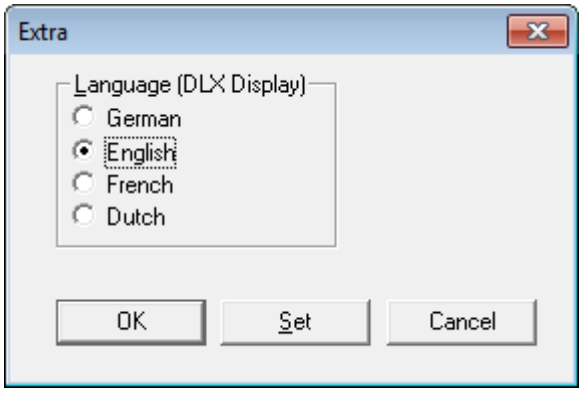


Figure 60, Extra

Language (DLX Display):
Select the language to be used on the DLX display.

Currently four languages are available:

- German
- English
- French
- Dutch

➢ **This dialog does not change the language used in the programming software DLXPara.**

7 Connection

7.1 Password

Input for the password for “Parameters”.

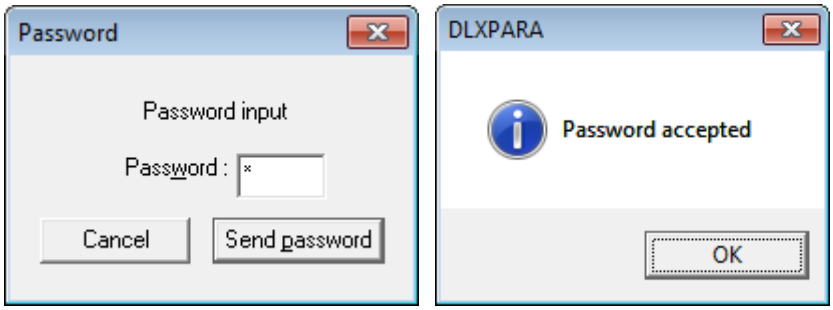


Figure 61, Password

➢ **Without input of the correct password for “Parameters” no parameters can be transmitted to the DLX when selecting the menu item “Set all parameters”.**

Connect the service interface of the DLX to the PC/Laptop by means of a programming cable (see menu item “Connection to the DLX”).

You can select one of two modes of programming:

Programmable parameters:
in order to transmit programmable values in the DLX, the program protection switch at the backside of the display board must be in the position “**Set Enable**” (see also the DLX User Manual).

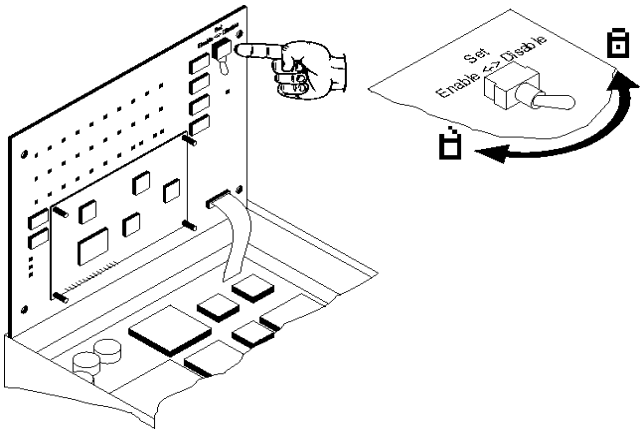


Figure 62, Program protection switch by housing for panel mounting

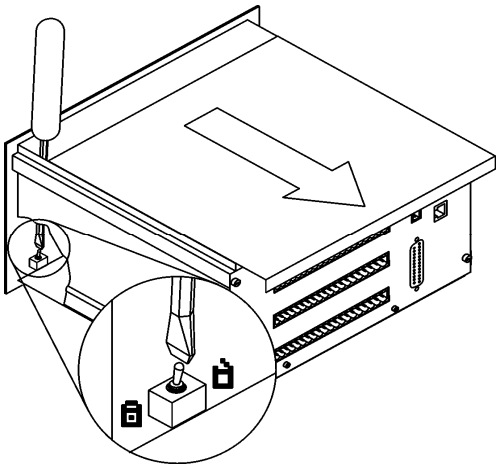


Figure 63, Program protection switch by 19" rack

Settable parameters:

for the transmission of settable parameters the setting of the program protection switch is not checked. Enter the relevant password now and click on the button "Set Password".

Once the DLX accepts the password it will stay active for 15 minutes and will be automatically reset afterwards. If you want to program the DLX after this time has elapsed, you need to re-enter the password.

If there is no connection between the DLX and the PC/Laptop or if the wrong cable is being used, a corresponding error message will be displayed. In this case please check correct connection of the cable and the cable itself.

- **All passwords in the DLX have a length of 8 digits and consist exclusively of numbers from "0" to "9". Leading zeroes "0" can be omitted when entering passwords in the programming software.**

Example: Password = 00000001
→ Entering 1 is permitted.

7.2 Password change

7.2.1 Change parameter password

Changing the “Parameters” password.

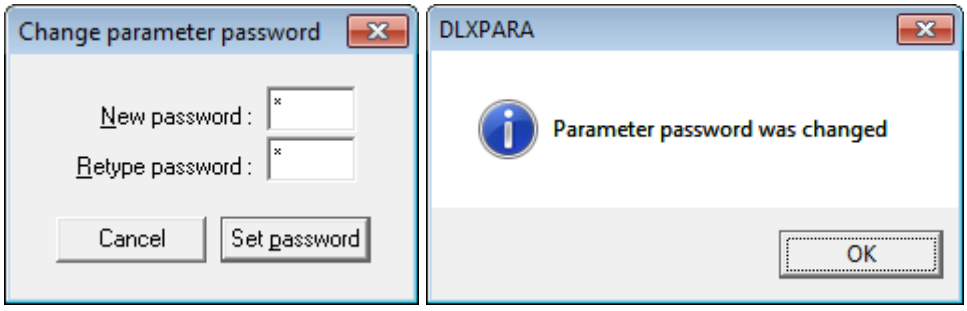


Figure 64, Changing the password for “Parameters”

- **In order to change the "Parameters" password in the DLX, you first need to enter the correct active password for "Parameters" (factory setting for this password: "00000001")! Leading "0" can be omitted.**

  Enter the new password in the field “New password” and repeat the password in the field “Retype password”. Then click on the button “Set password”.

  Passwords can have up to 8 digits. If you enter less than 8 digits, the password is extended to the left with leading zeroes. If both passwords are identical the DLX will be programmed to the new password. If you have entered two different passwords, an error message will be displayed. The new password will not be accepted and the original password remains active.

Example: New password = 123

→ the password will be set internally to 00000123, where the leading zeroes can be omitted when entering the password

- **If you forget the password you need to perform a unit restart. Please note that during a unit restart all currently stored data will be lost. Therefore the device should be read prior to this!**

7.2.2 Change other passwords

Changing the passwords for “Set”, “PC-Card”, “Restart” and “Reset”.

Figure 65, Changing other passwords

- **In order to change any other passwords in the DLX you first need to enter the current password for “Parameters”!**

Here you can change the passwords for the above mentioned items. Passwords can have up to 8 digits.

How to change a password:

Select the category for which a new password shall be defined and enter the new password. Then click on the button “Set password”. All other passwords will be reset to the factory settings.

- **If you only change one password, then all other passwords will be reset to the factory settings:**

Set:	2 (or 00000002)
PC Card:	3 (or 00000003)
Factory settings:	4 (or 00000004)
Reset:	5 (or 00000005)

If you delete the default setting from the input field and you do not enter another password, then that password will be set to “00000000” after programming the unit.

Changing all passwords:

Enter the new passwords and then click on the button “Set passwords”. The passwords will be set to the new values. Passwords can have up to 8 digits. If you enter less than 8 digits, the passwords will be extended to the left with leading zeroes (see also menu item “Change parameter password”).

7.3 Factory settings

Activation of a DLX unit restart after entering the password. A unit restart will cause the factory settings to be activated.

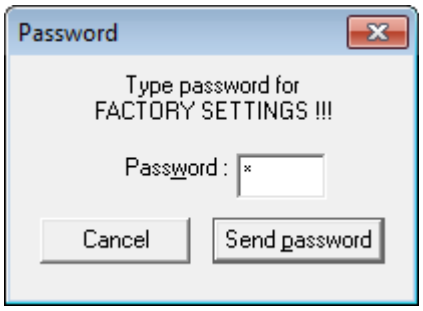


Figure 66, Unit restart (and reload of factory settings)

- **The activation of a unit restart in a connected data logger will erase all data from the unit. All previously set parameters and all registered data will be reset to the factory settings. A unit restart can be activated if the program protection switch is set to the position "Set Enable".**

  If you select this menu item and enter the current password for "Factory settings", the data logger connected will perform a unit restart. If you enter the wrong password, the error message "wrong password" will be displayed when you click on the button "Send password".

  If you enter the correct password, the message "password accepted" will be displayed when you click on the button "Send password". The DLX will execute a system test after the restart and will then use factory default settings: all passwords (including the password for unit restart) and the complete memory will be erased and reset to the factory settings! The data logger then needs to be programmed again to return it to ready status for operation!

7.4 Set all parameters

Program the DLX with the values from the currently open parameter file.

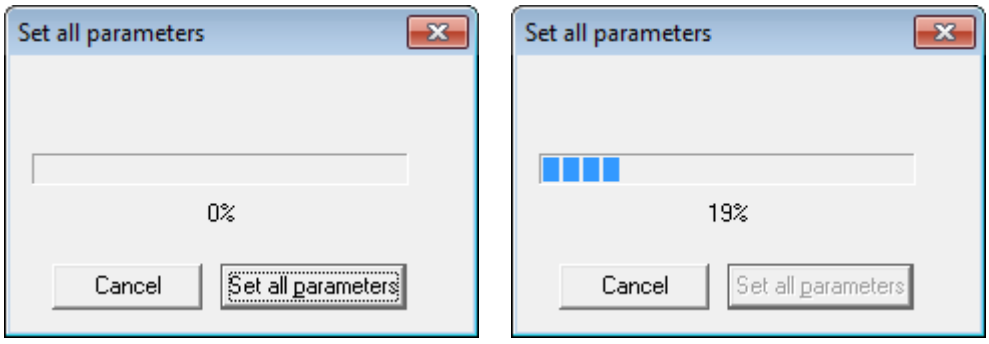


Figure 67, Set all parameters

You can define all the parameters for a data logger on a stationary PC and then program the device later on site by means of a laptop computer. Use this function (after having opened the relevant parameter file) to program a unit on site.

- **You should execute a unit restart in the DLX before programming it to new parameters. Prior to this the data logger needs to be activated by entering the "Parameters" password. Parameters can only be programmed if the program protection switch is set to position "Set Enable". The programming of a unit can take some time!**

  Click on the button "Set all parameters" to send all parameters (except passwords) to the previously activated DLX. If you have not yet entered the "Parameters" password, an error message will be displayed. During the transmission of parameters to the DLX the "Service" LED at the DLX front panel will blink and the display will show the message "Password is active!".

- **If the download of parameters was preceded by a unit restart, you need to note that all passwords have been reset to the factory default settings and these will not programmed by executing this function. If you want the DLX to have specific passwords, you must use the function "Connection ► Password change".**
- **If the basic parameters (such as the registration period length, the selection of signals for the load profiles and the number of inputs, summation units, apparent demand units and tariff rates) remain unchanged, then the load profile memory will not be erased.**
- **During the download of parameters into the DLX data retrieval from the unit is suspended due to reasons of data integrity.**

7.5 Change pulse ratio

Read and modify the pulse weighting ratios from a connected DLX.

The input's pulse ratio values can be modified anytime, even in calibrated devices (see corresponding German-PTB rules). This may be necessary if the impulse source (e.g. meter) is changed.

First connect the service interface of the DLX to the PC/Laptop by means of a programming cable (see menu item "Connection to the DLX", page 21). After selecting the menu item "Change pulse ratio" enter the relevant password (see menu item "Password", page 83).

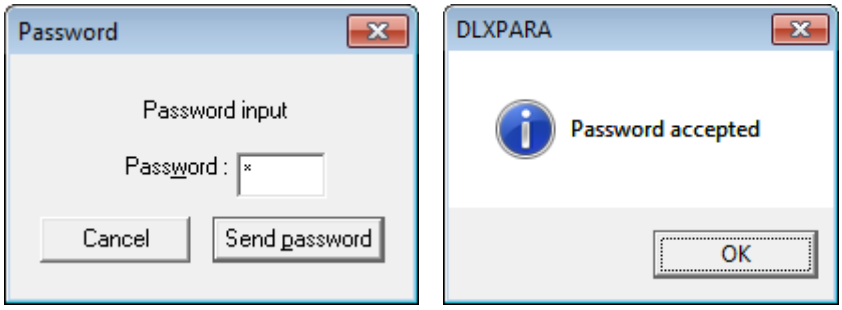


Figure 68, Change pulse ratio: Password

All required parameters will now be read from the connected DLX and uploaded into the programming software. This function will also automatically read the number of inputs, the assignments to summation units and the parameters for outputs, but these cannot be modified in this dialog.

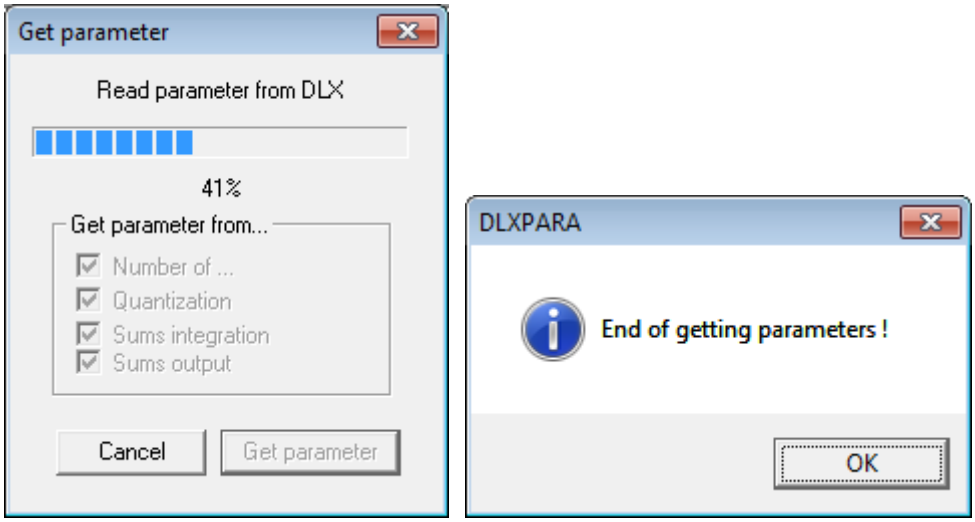


Figure 69, Change pulse ratio: Get parameter

You can now modify all the pulse weighting factors for the individual pulse inputs (see menu item “Pulse ratio”, page 35).

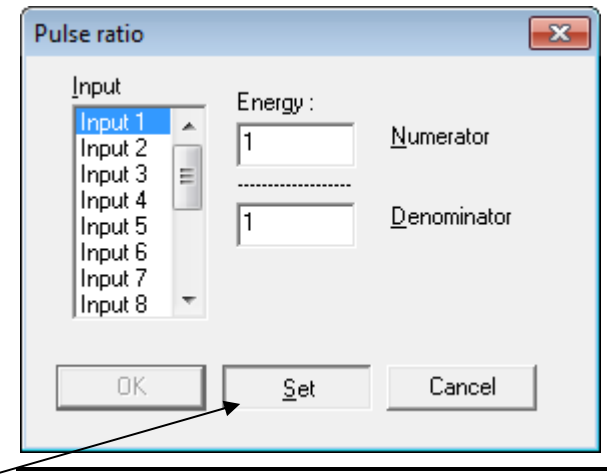


Figure 70, Change pulse ratio

Click on the button “Set” to send them to the DLX. Transmission of data is visualized by progress bar:

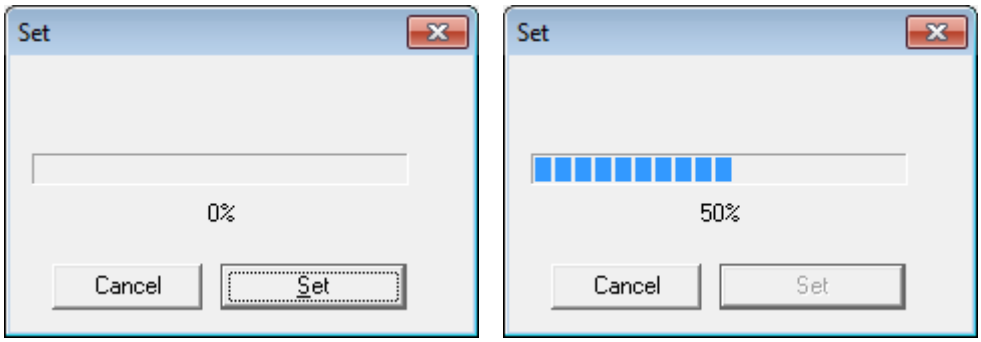


Figure 71, Change pulse ratio: Set

On successful modification of pulse ratios the program displays this message:

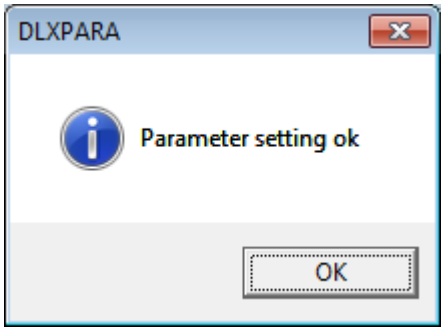


Figure 72, Change pulse ratio: OK

- **This parameter change should be documented for later reproduction.**

7.6 Get parameters

Read all parameters from a connected DLX unit.

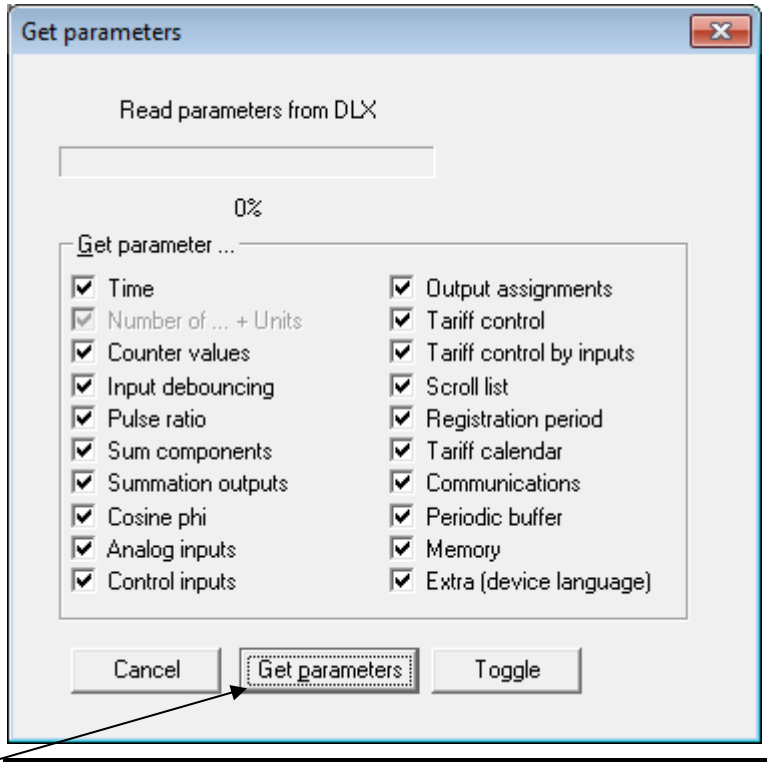


Figure 73, Get parameters

Click on the button “Get parameter” to read all active parameters from the connected DLX unit and to upload them into the programming software. Existing settings will be overwritten. You can use the menu item “**File ► Save As…**” to store the read parameters into a file.

- **If you need to change the program in a DLX, but you also need to make use of already registered data (e.g. current counter values), then you need to read all data from the DLX and save this under a new filename. Parameter changes must then be done by using this file.**

Get parameters:
Parameters related to marked check boxes will be read from the DLX via the service interface.

Toggle:
This button toggles the marks for all parameters (from “off” to “on” and vice versa).

If no check boxes have been marked then all will be activated.

- **The check box for “Number of… + Units” is always marked.**

7.7 Port

Defines the PC COM port used to connect to a DLX via programming cable.

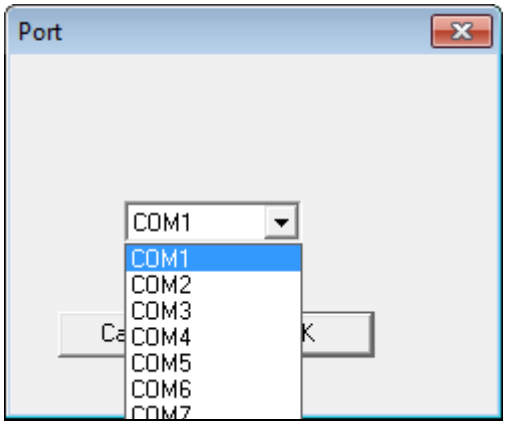


Figure 74, Port selection

Select the desired COM port (COM1 to COM30) and click on the button “OK”. The selected interface will be activated and the new setting will be stored in the current directory (file: “DLXPARA.INI”).

The program also saves the current language and the names of the last four parameter files in „DLXPARA.INI“.

7.8 Language

Select a language for the programming software **DLXPara**.

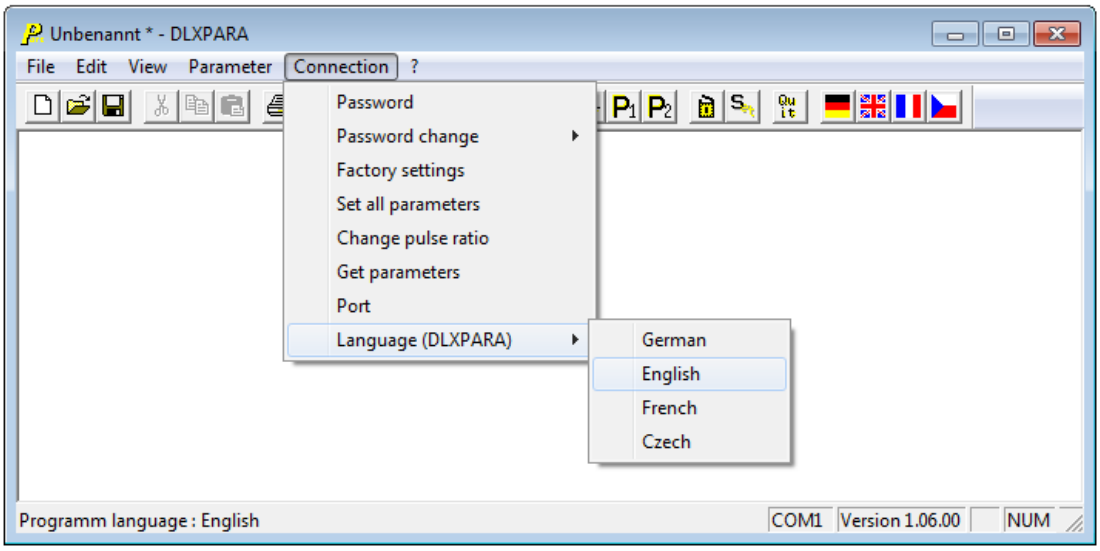


Figure 75, Language

Select the desired language for the programming software **DLXPara**. The selected language will be activated immediately and the current setting will be stored in the current directory (file: “DLXPARA.INI”).

Currently you have a choice of four languages:

- German
- English
- French
- Czech

➢ **This dialog does not change the language used in the display of the DLX device: see also menu item "Extra (device language)", page 82.**

Appendix A

Possible Error Messages

1 Error messages

Before changing parameters the correct parameter password must be sent to the DLX device, otherwise the DLX returns an error message:

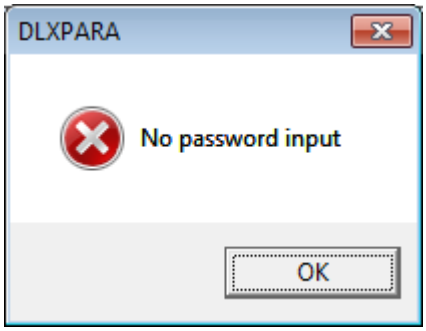


Figure 1, Error message DLXPARA: wrong password

In case of old DLXPARA-Software (version up to 1.05.06) and DLX from version 1.06.00 and up: the DLX returns an error message:

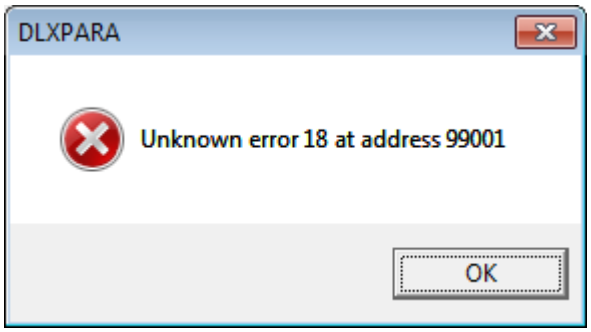


Figure 2, Error message DLXPARA: wrong software version

Action: Use the actually version of DLXPARA.

DLXPARA checks all inputs and returns an error message in case of wrong parameter.

Example: Wrong synchronisation windows:

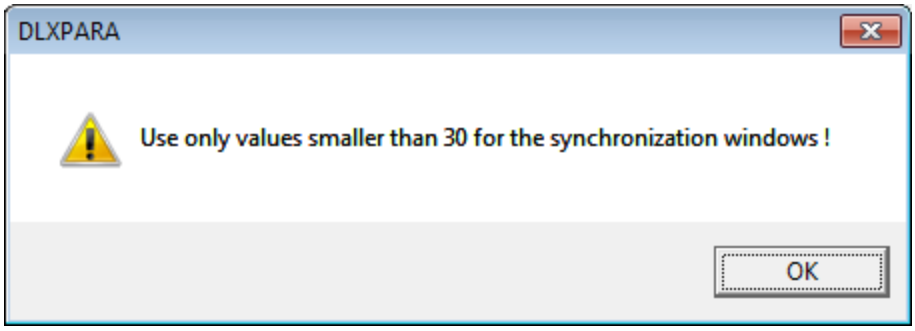


Figure 3, Error message DLXPARA: wrong input value

If it receives wrong input data the DLX returns an error message, too.

Example: Address 64005 (SYN window time) is wrong:

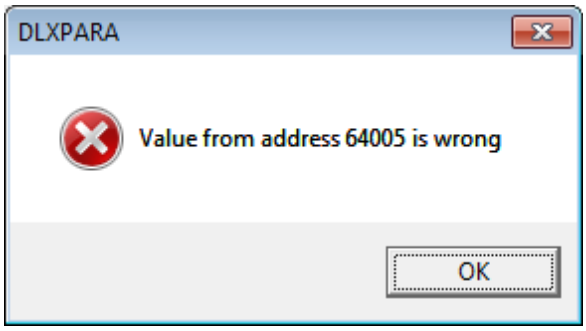


Figure 4, Error message DLX: wrong value

Example: Address 64202: wrong address in the scroll list:

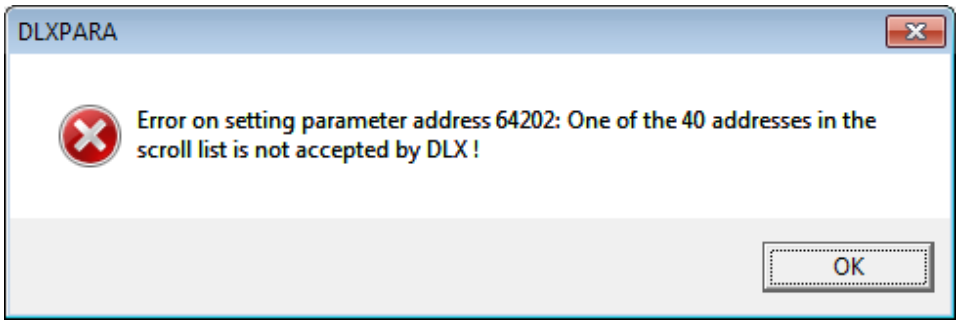


Figure 5, Error message DLX: wrong address in the scroll list

If an error message appears during the download of parameters into the DLX, the download of parameters will be terminated.

Example: The DLX was not programmed with new parameters.

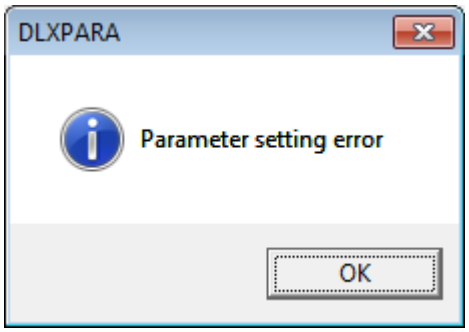


Figure 6, Parameter download termination

Before you can restart the parameter download you must first correct the wrong value. The following table should be helpful in this regard:

Address	Error in/at...	.. in menu item (▸ sub menu item)
00000	Setting the time (clock time, summer-time, switching time)	Time
00002	Synchronization (external radio clock / SYN input / no synchronization)	Time
00004	Interpretation of radio clock telegram	Time (currently optional)
00005	Setting the time via SCTM	Time
10000	Input register value without rate	Counter values
10001	Input register value for rate 1	Counter values
10002	Input register value for rate 2	Counter values
10003	Input register value for rate 3	Counter values
10004	Input register value for rate 4	Counter values
10100	Positive sum without rate	Counter values
10101	Positive sum for rate 1	Counter values
10102	Positive sum for rate 2	Counter values
10103	Positive sum for rate 3	Counter values
10104	Positive sum for rate 4	Counter values
10200	Negative sum without rate	Counter values
10201	Negative sum for rate 1	Counter values
10202	Negative sum for rate 2	Counter values
10203	Negative sum for rate 3	Counter values
10204	Negative sum for rate 4	Counter values
20000	Minimum High phase, input	Pulse in-/outputs ▸ Input debouncing
20100	Minimum Low phase, input	Pulse in-/outputs ▸ Input debouncing
20200	Maximum High phase, input	Pulse in-/outputs ▸ Input debouncing
20300	Input inversion	Pulse in-/outputs ▸ Input debouncing
20400	Input – Pulse barrier (before top)	Pulse in-/outputs ▸ Input debouncing
20500	Input – Pulse barrier (after top)	Pulse in-/outputs ▸ Input debouncing
20600	Input – Pulse barrier (active)	Pulse in-/outputs ▸ Input debouncing
20700	Instantaneous value	Pulse in-/outputs ▸ Input debouncing
21000	Multiplier for sum 1	These values are calculated internally from the allocation of inputs to summation units and their weighting factors
21001	Multiplier for sum 2	
21002	Multiplier for sum 3	
21003	Multiplier for sum 4	
21100	Common Divisor for summation units	
22000	Settings for analogue inputs	Analog inputs: minimum value
22100	Settings for analogue inputs	Analog inputs: maximum value
22200	Settings for analogue inputs	Analog inputs: signal type 0mA..20mA / 4mA..20mA
22300	Settings for analogue inputs	Analog inputs: value type (calculation) instantaneous value / average value
28100	Terminal for positive sum output	Control in-/outputs ▸ Output assignments

Address	Error in/at...	.. in menu item (▸ sub menu item)
28101	Terminal for negative sum output	Control in-/outputs ▸ Output assignments
28102	Terminal for MPA	Control in-/outputs ▸ Output assignments
28103	Terminal for RSTA	Control in-/outputs ▸ Output assignments
28104	Terminal for Alarm	Control in-/outputs ▸ Output assignments
28105	Terminal for TRA	Control in-/outputs ▸ Output assignments
28106	Time for MPA	Control in-/outputs ▸ Output assignments
28107	Time for RSTA	Control in-/outputs ▸ Output assignments
28108	RSTA mode (pulse / switch)	Control in-/outputs ▸ Output assignments
28109	Time for alarm (duration)	Control in-/outputs ▸ Output assignments
28110	Alarm mode (pulse / switch)	Control in-/outputs ▸ Output assignments
28111	Terminal for LOG signal	Control in-/outputs ▸ Output assignments
28112	Terminal for input (In..) → output (Out..)	Control in-/outputs ▸ Output assignments
28700	Input for active energy	Pulse in-/outputs ▸ Cosine phi
28701	Input for reactive energy	Pulse in-/outputs ▸ Cosine phi
29000	Output pulse length HIGH-time	Pulse in-/outputs ▸ Summation outputs
29100	Output pulse length LOW-time	Pulse in-/outputs ▸ Summation outputs
29200	Pulse output	Pulse in-/outputs ▸ Summation outputs
29300	Hysteresis	Pulse in-/outputs ▸ Summation outputs
29400	Output inversion	Internal: fix
30000	Pulse conditioning numerator	Pulse in-/outputs ▸ Pulse ratio
30100	Pulse conditioning denominator	Pulse in-/outputs ▸ Pulse ratio
30200	Number of decimals for energy register	Number of… ▸ Unit
30201	Number of decimals for sums energy register	Number of… ▸ Unit
30202	Number of decimals for demand register	Number of… ▸ Unit
30203	Number of decimals for sums demand register	Number of… ▸ Unit
30204	Number of decimals for complex power register	Number of… ▸ Unit
31000	Number of inputs, rates or summation, balance calculation	Number of…
31001	Number of cosine phi registers	Number of…
31002	Number of analogue inputs	Number of..
64001	Reset blocking time	Control in-/outputs ▸ Control inputs
64002	Scroll list delay time	Control in-/outputs ▸ Control inputs
64003	SYN window: alarm-free	Time
64004	SYN polarity	Control in-/outputs ▸ Control inputs
64005	Reset counter	Control in-/outputs ▸ Control inputs
64006	Automatic reset control	Control in-/outputs ▸ Control inputs
64007	SYN window time	Time
64100	Terminal for SYN signal	Control in-/outputs ▸ Control inputs
64101	Terminal for TR signal	Control in-/outputs ▸ Control inputs
64102	Terminal for RSTX signal	Control in-/outputs ▸ Control inputs

Address	Error in/at...	.. in menu item (▸ sub menu item)
64103	Terminal for Log input signal	Control in-/outputs ▸ Control inputs
64104	Scroll list control settings (ANZ)	Control in-/outputs ▸ Control inputs
64200	Text of a scroll list entry	Control in-/outputs ▸ Scroll list
64201	Unit of a scroll list entry	Control in-/outputs ▸ Scroll list
64202	Address of a scroll list entry	Control in-/outputs ▸ Scroll list
64300	Tariff control inputs for demand	Control in-/outputs ▸ Tariff control by inputs
64301	Tariff control inputs for energy	Control in-/outputs ▸ Tariff control by inputs
64310	Rate combination demand	Control in-/outputs ▸ Tariff control by inputs
64311	Rate combination energy	Control in-/outputs ▸ Tariff control by inputs
64400	Rate determination (calendar/external)	Control in-/outputs ▸ Tariff control
64401	Demand tariff rate text	Control in-/outputs ▸ Tariff control
64402	Energy tariff rate text	Control in-/outputs ▸ Tariff control
70100	Length of registration period	Registration period
70101	Starting time of registration period	Registration period
71000	Season in tariff calendar	Tariff calendar ▸ Tariff calendar
71001	Allocation of daily rate tables	Tariff calendar ▸ Tariff calendar
71002	Daily rate table 1	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
71003	Daily rate table 2	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
71004	Daily rate table 3	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
71005	Daily rate table 4	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
71006	Daily rate table 5	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
71007	Daily rate table 6	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
71008	Daily rate table 7	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
71009	Daily rate table 8	Tariff calendar ▸ Tariff calendar ▸ Daily rate table
72000	Public holidays	Tariff calendar ▸ Public holidays
80001	Transmission protocol (SCTM/IEC)	Communication ▸ Transmission settings
80002	Modem init. string	Communication ▸ Transmission settings
80003	Callback function (active)	Communication ▸ Transmission settings
80004	Callback: phone number	Communication ▸ Transmission settings
80005	Callback: time till callback	Communication ▸ Transmission settings
80006	Callback: number of call tries	Communication ▸ Transmission settings
80007	Callback: time till hang up	Communication ▸ Transmission settings
80008	Communication password	Communication ▸ SCTM Protocol
80200	SCTM unit identification (5 / 8 digits)	Communication ▸ SCTM Protocol
80201	Unit identification	Communication ▸ Communication
80202	Link address	Communication ▸ IEC 60870-5-102 Protocol
80203	Unit address	Communication ▸ IEC 60870-5-102 Protocol
80204	Number of bytes (IEC 60870-5-102)	Communication ▸ IEC 60870-5-102 Protocol
80205	Transmit tariff info	Communication ▸ IEC 60870-5-102 Protocol
80206	Meter/value type (billing / operating)	Communication ▸ IEC 60870-5-102 Protocol
80207	Multi buffer transmission	Communication ▸ IEC 60870-5-102 Protocol
80208	Transmit more then 16 values per registration period	Communication ▸ SCTM Protocol

Address	Error in/at...	.. in menu item (▸ sub menu item)
80209	Unit identification with 8 digits	Communication ▸ SCTM Protocol
80210	Modbus device address: 1 to F7 (hex)	Communication ▸ Modbus RTU Protocol
80300	Baud rate (data com port)	Communication ▸ Transmission settings
80400	Type of load profile data (demand, energy, energy feed)	Periodic buffer ▸ Buffer options
80401	Number of decades (digits)	Periodic buffer ▸ Buffer options
80403	Tariff information	Communication ▸ SCTM Protocol
80404	Mark device status on LOG signal	Communication ▸ SCTM Protocol
80405	Time and summertime-bit	Communication ▸ SCTM Protocol
80500	Buffer allocation (PC-Card)	Memory
80502	Internal memory allocation	Memory
82000	Unit text for demand	Number of … ▸ Unit
82001	Unit text for energy	Number of … ▸ Unit
82002	Physical unit for an input	Number of … ▸ Unit
82003	Physical unit for a summation unit (+)	Number of … ▸ Unit
82004	Physical unit for a summation unit (–)	Number of … ▸ Unit
82005	Physical unit for apparent demand	Number of … ▸ Unit
82100	Input in load profile 1	Periodic buffer ▸ Periodic buffer 1
82101	Positive sum in load profile 1	Periodic buffer ▸ Periodic buffer 1
82102	Negative sum in load profile 1	Periodic buffer ▸ Periodic buffer 1
82103	Apparent demand in load profile 1	Periodic buffer ▸ Periodic buffer 1
82104	Positive Cosine in load profile 1	Periodic buffer ▸ Periodic buffer 1
82105	Negative Cosine in load profile 1	Periodic buffer ▸ Periodic buffer 1
82200	Input in load profile 2	Periodic buffer ▸ Periodic buffer 2
82201	Positive sum in load profile 2	Periodic buffer ▸ Periodic buffer 2
82202	Negative sum in load profile 2	Periodic buffer ▸ Periodic buffer 2
82203	Apparent demand in load profile 2	Periodic buffer ▸ Periodic buffer 2
82204	Positive Cosine in load profile 2	Periodic buffer ▸ Periodic buffer 2
82205	Negative Cosine in load profile 2	Periodic buffer ▸ Periodic buffer 2
90200	Language	Extra
99001	Parameter password	Connection ▸ Password change ▸ Parameter password **Unknown error 18**: Old version of the DLXPARA! Use an update.
99002	Password for unit restart (factory settings)	Connection ▸ Password change ▸ Other passwords