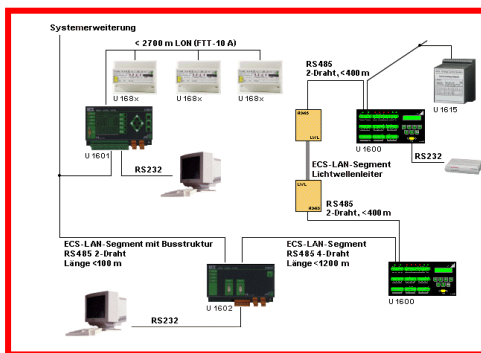


NET-TREND

Fischer & Partner KG



ECSwin
<http://www.ecswin.de>

Version 3.7

Manual

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 The U16xx summators are manufactured by GOSSEN-METRAWATT GmbH, Nuremberg, Germany.

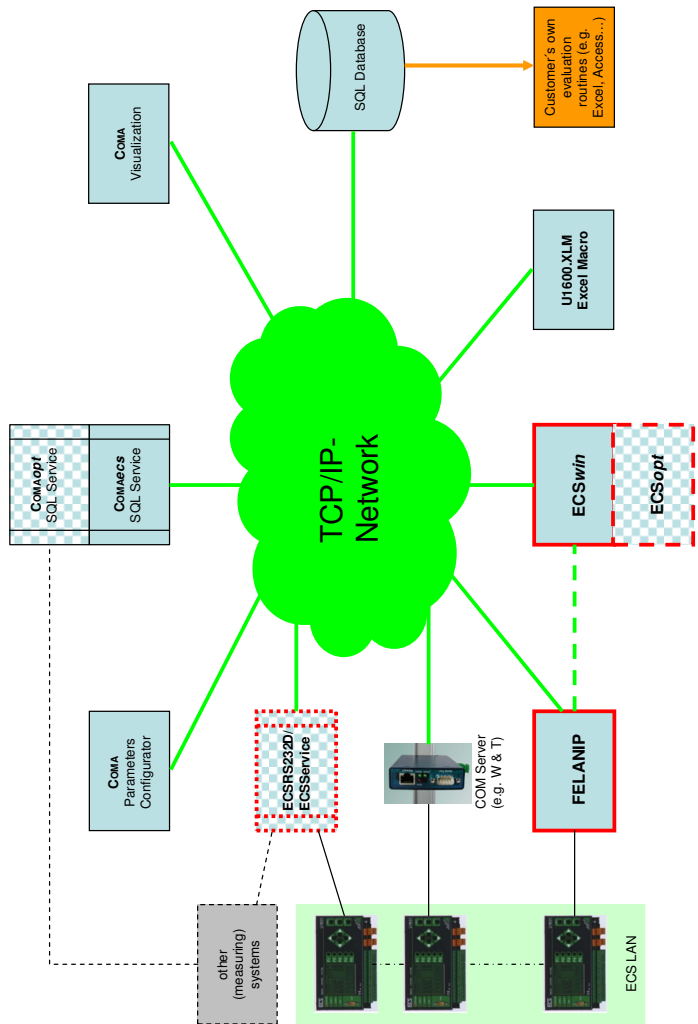


Figure 1: system overview

1 Basic Information Concerning the Program

1.1 System Attributes

The **ECSwin** program described below is used primarily for configuring and setting parameters for type U16xx summators (U1600, U1601, U1602, U1603 and U161x) within an **Energy Control System** (ECS LAN). Beyond this, the program is capable of acquiring energy consumption data, and visualizing them in the form of measurement value tables and graphic representations. The 32 bit programs can be used with all 32 or 64 bit versions of the Microsoft Windows operating system (Windows 95/98/ME, Windows NT/20xx/XP/Vista/7/8).

Data exchange with the summators within the ECS LAN is not accomplished directly, but rather by means of a special server program which saves data from the clients to intermediate storage, maintains communication with the ECS LAN via a serial RS 232 interface (including protocol, checksum etc.) and finally forwards response data to the client.

In light of this, **ECSwin** must be viewed as a client program. The server program can be installed to a different network PC than the client program if desired, although this is not necessary. The TCP/IP network protocol is used for communication between the server and the client. `ECSDIENST.EXE` or `FELANIP.EXE` can be used as a server program. A dedicated COM server (e.g. from W & T, which however usually only permits one client connection) can be used instead of a server program. Figure 1 provides a basic overview of the system's expansion options.

`FELANIP.EXE` is an autonomous terminal program with special capabilities for the analysis of data transmission problems at the ECS LAN, as well as between client and server. Dialing remote summators via modem is also supported. This Windows user program can serve several clients, and is included with the **ECSwin** program package.

`ECSDIENST.EXE` (`ECSService.EXE`) is a Windows NT service program which can be purchased separately if required. The primary advantage of the NT service is the fact that a client program is always at its disposal, regardless of whether or not a user is logged on at the effected PC or server. This program does not have a visible user interface and can also serve several clients, beyond which it supports additional Windows based authentication and access control functions, but it cannot be used with Windows 95, 98 or ME.

1.2 ECSwin Program Attributes

The following components are made available by **ECSwin**:

- Terminal window
- ECS LAN logon window
- ECS LAN clock setting window
- Summator parameters configuration window
- Channel parameters configuration window
- Set meter readings window
- Relay parameters configuration window
- Window for transfer user generated commands to the summator
- Window for creating virtual channels
- Graphic representation of summator control panel (with display, keypad and LEDs)
- Graphic representation of ECS LAN network topology
- Query and display of interval, daily, monthly and annual measurement data for energy and power stored to the summator (as table or characteristic curve)
- Query and graphic representation of instantaneous measurement values in recorder format.

The following is intended to provide a brief description of the most important program components.

The **Terminal** window allows for free communication with a U16xx summator, although the user must possess thorough knowledge of the **Energy Control Language (ECL)** to this end.

The windows for summator and channel parameter configuration provide the user with the opportunity of transmitting all of the basic parameters for summator operation to any desired summators within the ECS LAN in an easy, convenient fashion. Parameter profiles can be saved to data files, and can be used to set up additional summators.

The virtual channel configuration window provides for easy access to all summators within the ECS LAN, and their channels. A list of channels used for the generation of summated values can be created by selecting the appropriate channel names. After the number of virtual channels has been established, the background program is generated by **ECSwin**.

As a rule, the program components included in the **Display** menu do not make any changes to summator parameters or data. They are used exclusively for the graphic representation of measurement data and status information.

The **LAN topology** command pinpoints the summator which is connected to the PC, reads a list of all neighbors to the right and to the left of each summator and uses this information to generate a schematic representation of the ECS LAN.

Measurement data can be read out from the U16xx summators with the **Energy/Power** and **Recorder** windows, and can be displayed in tabular form or as a characteristic curve. Whereas the **Energy/Power** window is used to read out data which have been stored to the summators, the online recorder allows for visualization and storage (to a PC) of data (e.g. instantaneous power), which would otherwise be irretrievably lost.

1.3 FELANIP Program Attributes

The **FELANIP** program (**FELANIP.EXE**) can be used to establish communication between the PC and the summator. In the case of a standard installation, its files are copied to the same directory as is also the case with **ECSwin**, and it's started there as well along with **ECSwin** with the **as icon** attribute. When **ECSwin** is started, it checks to see if **FELANIP** has already been initialized. If this is not the case, **FELANIP** is started and displayed as an icon. It is thus unnecessary for the **ECSwin** user to start **FELANIP** separately. However, **FELANIP** can also be used as a stand-alone program for communication with the ECS LAN by means of ECL (**E**nergy **C**ontrol **L**anguage).

Most importantly, **FELANIP** is equipped with a series of special characteristics which can be quite helpful if troubleshooting should become necessary. Additional information is available from the **FELANIP** online help file. This program includes an auto-exit function in the file menu. If this function is activated, **FELANIP** is exited automatically when **ECSwin** is closed. Activation of this option (which remains active even after the program has been exited) is only advisable for the standard installation, because this makes the PC's serial interface available to other applications after **ECSwin** is exited.

1.4 Installation

A 32 or 64 bit version of Microsoft Windows (Windows 95/98/ME, Windows NT/20xx/XP/Vista/7/8) is required for use of **ECSwin**. The installation CD includes an installation program (**SETUP.EXE**), which automatically copies and extracts the compressed data files to the hard disk, and which also creates a program group and the icons required for starting the applications. Cross

references are also established by the installation program which allow for complete de-installation of all program components included with **ECSwin**. Use the uninstall function in the Windows **Software** window if de-installation is required.

Standard or user defined installation can be selected. Standard installation allows for single PC operation without any adaptation as shown in figure 2 – if required with connection to the U16xx system via modem as well.

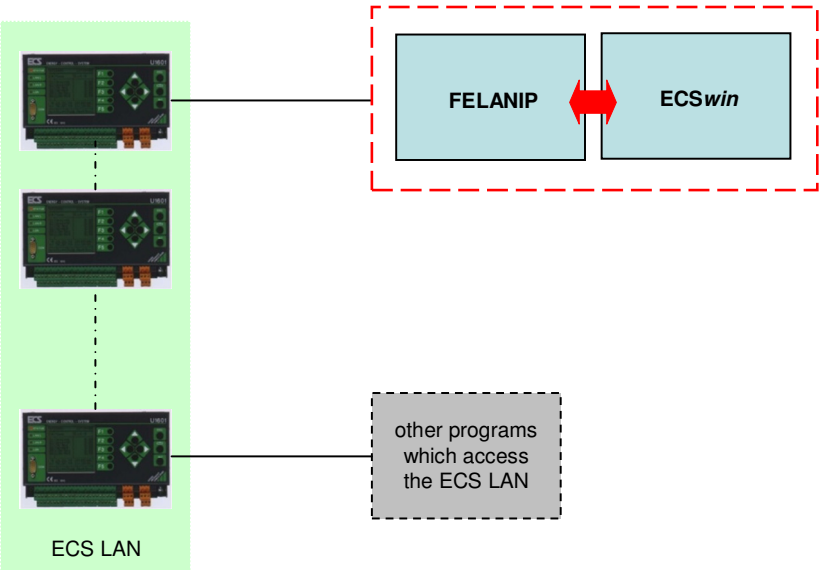


Figure 2

If user defined installation is selected, **ECSwin** and **FELANIP** can be installed separately with or without standard INI files. For example, only the ECSwin component is required in the case of installation for use at a COM server (without COM redirection) as shown in figure 3. The first time the program is started, the address and the data port number of the COM server must be set up as a target host.

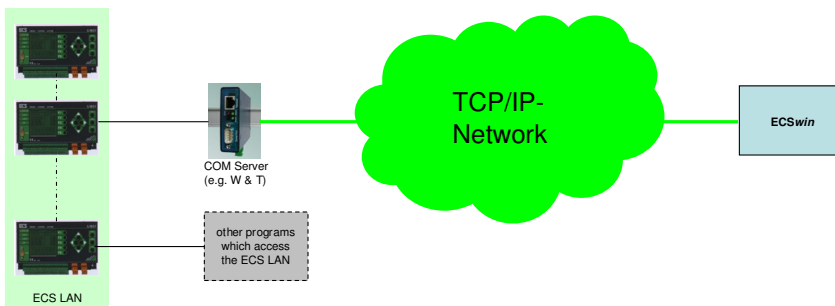


Figure 3

An example of a multi-client system is depicted in figure 4. Instead of the recommended **ECS SERVICE** program, **FELANIP** could be installed to a PC if utilization as a user program is acceptable.

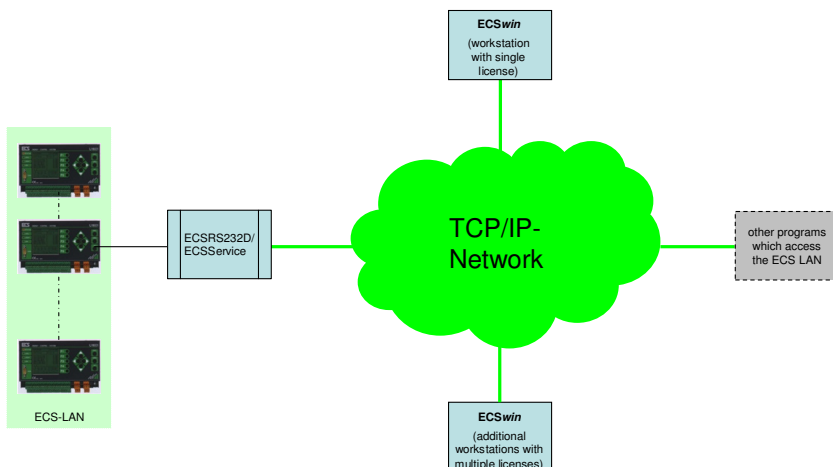


Figure 4

If multi-client operation with a W & T COM server if required, this can be implemented by additionally installing the COM redirection software, and either `ECSDIENST.EXE` (`ECSService.EXE`) or `FELANIP.EXE` to the same PC:

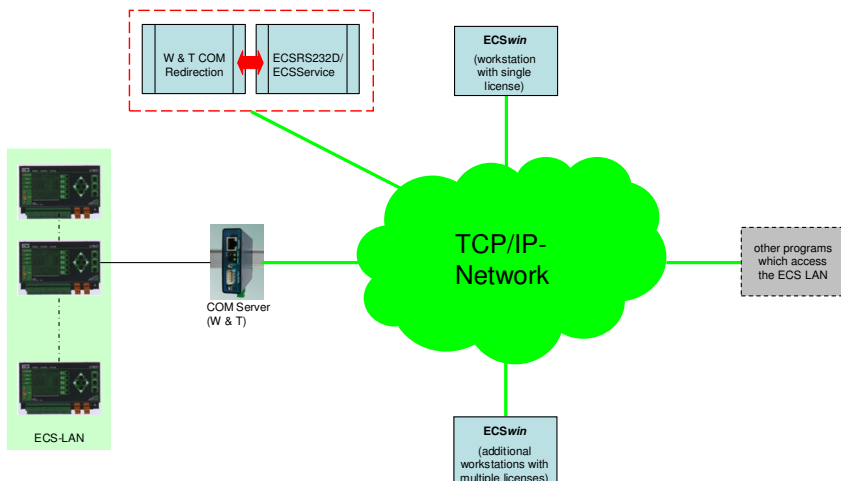


Figure 5

Expansion to a multi-server (multi-client) system, an example of which is shown in figure 6, is also possible. Several ECS LANs, for example at geographically separate locations, can be served, as long as the respective locations can be accessed within a correctly routed TCP/IP network (WAN). In this case, it's absolutely essential to use **ECSSERVICE** because implemented functions for authentication and access control which can also be extended to user nodes or groups registered in Windows (Active Directory) domains.

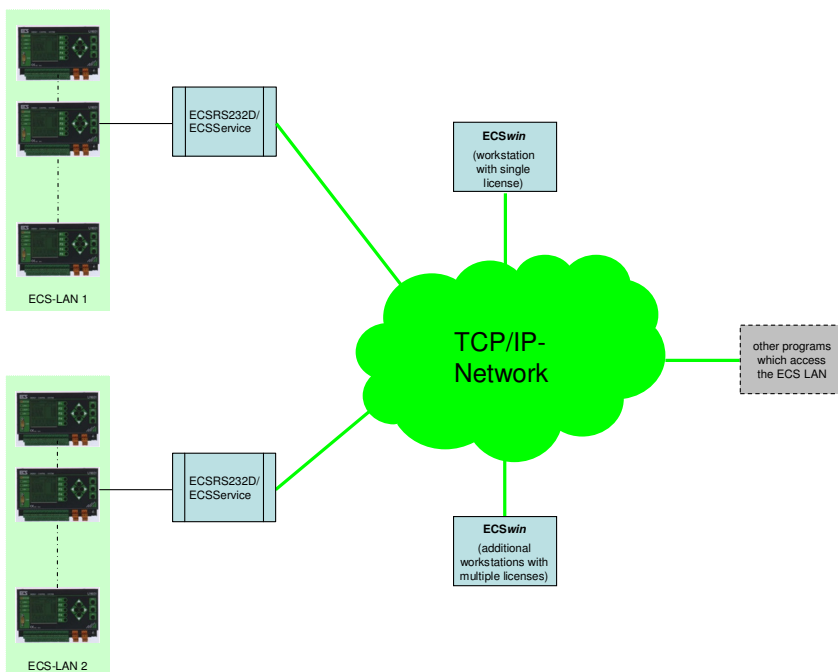


Figure 6

1.5 Using the Program *ECSwin*

The **ECSwin** user interface complies with the Windows **MDI** standard (**M**ulti **D**ocument **I**nterface). This means that any number of desired windows (of the same or different types) can be simultaneously opened, placed within the main window at any desired position and activated with dynamically generated menu entries (in the window menu). When a window is first opened, it is vertically and horizontally centered within the main program window. If required, windows are continuously refreshed with new data (e.g. recorder display panel). The flow of data to the windows (terminal, parameters configuring or display windows) is managed by the main program window. For example, several terminal windows can be opened (e.g. for the purpose of comparative displays) or several U16xx control panels can be provided with data from various summators within the ECS LAN independent of one another, and at the same time another window can be used to configure parameters at an additional summator.

In order to assure that the program windows are always identical as regards appearance after initialization of the program, positioning and size of the current windows, as well as several of their parameters (e.g. recognition of the summator which is currently being processed) can be saved to the in INI file. The menu items required to this end are located in the **Program** menu. The settings which have been saved to memory are restored by activating the **Save settings** function. If **ECSwin** is started with a parameter, this parameter is viewed by the program as the name of an INI file, in which case the attributes saved to the respective file are restored as soon as the program is started.

In addition to the usual menu bar, **ECSwin** is equipped with a toolbar (for direct initialization of important program components) and a status line (with special help and status information), which allow for quick access to various functions and easy navigation within the program.

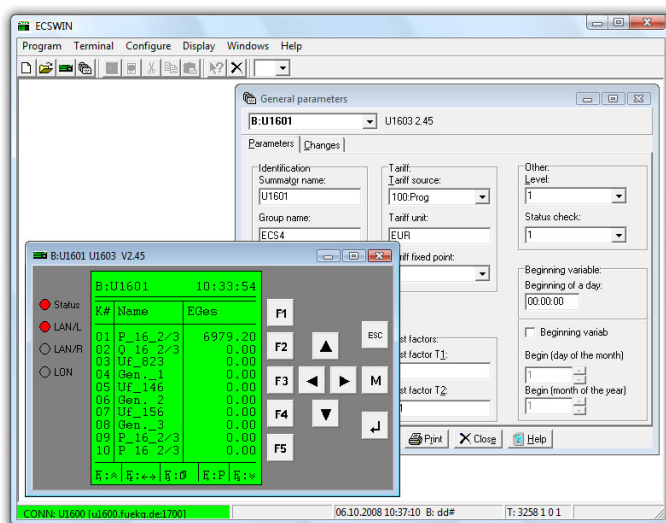


Figure 7

ECSwin allows for access to different menu items (e.g. in the toolbar) and window components depending upon the given situation. This means that the number and the availability of items included in the menu bar, as well as the availability of data entry fields and buttons in the windows, may vary. Windows can be minimized to icons. Even as icons, the windows still fulfill their data logging and transmission functions by communicating with the summator, if this is required by program logic. The individual program components can be started via the menu, or by clicking on the appropriate icon in the toolbar. Important system information and a brief explanation of the functions of the program components are displayed directly in the status line at the bottom of the main

program window. A brief note is also displayed concerning most of the graphic elements (e.g. buttons, data entry fields etc.) if the mouse pointer is positioned at the element and left there for a short period of time.

An attempt has been made to design the user interface such that uniform operation is assured, which is distinguished by the fact that the outward appearance of the windows is always similar, and that the same buttons and pop-up menus with the same labeling and identical functions are used throughout the entire user interface. As soon as data entry begins, the program tests the various parameters for plausibility, for example by testing the convertibility of numbers, or by restricting possible entries to allowable parameters. Different functions may be assigned to the buttons within different windows, depending upon the given situation. For example, if the **Print** button in the **Table** registry card is activated for the **Display|Energy/Power** window, data are printed out in tabular form, whereas the same button in the **Graphic** registry card prints out a diagram.

In addition to selecting the various elements with a window with the mouse pointer, the tab key can be used to navigate from one element to the next, or an element can be selected with the key combination **Alt** and the first letter of the element (if the element has an alphabetical designation). In some cases, several elements are grouped together (for example a group of buttons). Any of the elements within such groups can be selected with the scroll keys. Movement from one cell to the next within a table is accomplished with the up and down scroll keys. The right and left scroll keys are used within tables to change the data entry cursor position within a given cell. The tab key can be used to move to the next element within the window.

For the most part, **ECSwin** sets up the print layout for tables and graphics automatically. The user is able to select a printer, designate the printing direction (horizontal or vertical) and choose one of five typeface sizes (drop-down list in the program toolbar). Page margins, column widths and column breaks are laid out automatically by **ECSwin**. If special layout requirements exist, data can be copied from the tables to the Windows clipboard with the help of pop-up menus. This allows for the processing of data in other programs, for example Excel.

Most of the windows are capable of writing and reading parameters and data to and from data files. This allows for the archiving of helpful parameter profiles for later use. Default extensions are assigned to the names of the data files. These extensions are suggestions only which help to maintain good data organization, although they are not mandatory. In some cases, the given extension provides the program with information concerning specific data file attributes (explanations are included in the respective sections of this documentation). The predefined extensions must be used in such cases.

Data is always stored to the data files in text format. Elements within a given line in any table are separated by the tabulator character (#9), and table lines themselves are separated by a line break (#13#10). Data can thus be processed by a wide variety of various external programs.

1.6 Working with the Toolbar

The toolbar places a row of icons at the disposal of the user, which allow for direct access to important program functions by single clicking with the mouse. These functions include (designated below with the name of the respective menu item):



Figure 8

- **Terminal|New:** opens a new terminal window.
- **Terminal|Open:** opens the dialog box for the selection of a command file.
- **Display|Panel:** displays the control panel of one of the summators in the ECS LAN.
- **Configure|General Parameters:** opens a window for the configuration of general summator parameters.

The following symbols are used exclusively in combination with the terminal window and are integrated into the **Edit** menu. They are activated or deactivated, depending upon the given situation for this reason.

- **File|Save:** opens the dialog box for saving files, i.e. for writing the content of the active terminal window to a data file.
- **Edit|Select all:** selects the entire contents of the active window.
- **Edit|Cut:** deletes selected data and saves them to the Windows clipboard.
- **Edit|Copy:** copies selected data to the Windows clipboard.
- **Edit|Paste:** inserts data from the clipboard to the document at the current cursor position.

The two symbols described below are used to activate basic functions, i.e. online help and exiting the program:

- **Help|Index:** The mouse pointer is turned into a question mark. The corresponding help text is queried and displayed by selecting (clicking) an element within the window.
- **File|Exit:** initiates the standard Windows procedure for exiting a program.

A special function is activated with the drop-down list:

The drop-down list is used for selecting the size of the typeface used for the print-out of tables or graphics. User selection of the font is not provided for (as is also the case with the terminal window).

1.7 The Status Line

Important information concerning program functionality is displayed in the status line (at the bottom of the main program window). The status line is subdivided into five fields:

- 1 Information concerning the communications link to the server program is displayed at the left (e.g. IP address and the status of the connection to the server).
- 2 Status messages from the server program are displayed at the next field to the right (e.g. ECS LAN data transmission errors), as is information from the client windows (e.g. cursor position within the terminal window).
- 3 The command which is currently being executed is displayed in the next field.
- 4 The fourth field contains current information concerning data transmission (number of windows which are receiving data in a time controlled fashion, number of remaining commands to be executed and time in seconds since the last request was transmitted).
- 5 The last field displays a brief explanation of the element at which the mouse pointer is currently positioned.

2 Explanation of Program Components

2.1 The Program Menu

This menu contains functions which make it possible to administer connections to the ECS LAN:

- Connection with the target host or selection from a host list
- Abort connection
- Edit the host list.

In the case of standard installation as shown in figure 2, a function is included in the program menu which allows for access to the serial interface's parameters, and for administration of dial-up data for transmission via modem. The `FELANIP.EXE` server program displays the appropriate window. This window contains three registry cards for configuring parameters at the interface and the modem, and for dialing a remote summator via the modem:

- Serial interface parameters configuration
- Modem parameters configuration
- Maintenance of the phone number list and access to summators via the modem.

This function accesses resources and data from the server program which has been started at the same PC. These data are administered by the server and are immediately made available to all client applications.

If the `ECSDIENST.EXE` (`ECSService.EXE`) utility is used as a server program, this menu item does not appear. Interface parameters must be configured in the `ECSDIENST.INI` (`ECSService.INI`) file in this case, which is queried each time the service is started.

This menu item is also omitted if a COM server is used in an installation as shown in figure 3, or if **FELANIP** is running at another PC within the network.

Other basic program functions are made available as well:

- Save currently configured user interface
- Use a previously saved user interface
- Select and set up a printer
- Exit the program.

2.1.1 Connect / Hosts

This command establishes a TCP/IP network connection to a target host. If only one entry is included in the host list, the menu item is labeled **Connect**. If several target hosts are listed, the menu item is labeled **Hosts** and it opens a submenu from which a host entry can be selected. If a new target host is selected after a connection has been established, disconnection ensues immediately.

2.1.2 Disconnect

An existing TCP/IP connection can be disconnected with this command. The function is only enabled if no MDI window is longer active.

2.1.3 Edit Host List

This command makes it possible to edit the attributes of the target host(s). The user first has to select whether an existing entry will be edited or deleted, or a new entry will be added.

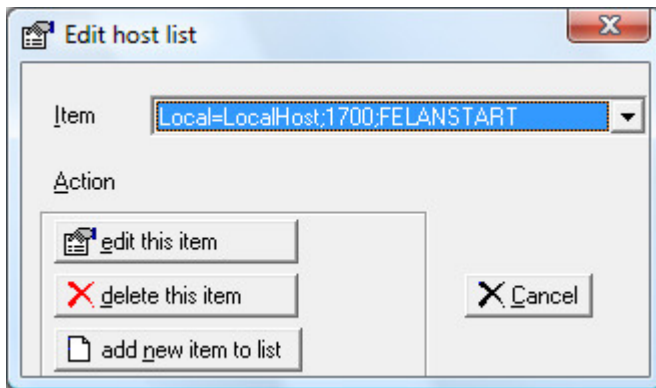


Figure 9

The list can be expanded as desired in a multi-server environment. Minimum requirements include any desired name for the connection, the host address and the server's port number. Host addresses may always be specified numerically (e.g. 192.168.0.99); if DNS name resolution is supported, also in the following format: `comserver.domain.com`, if WINS name resolution is supported, also in the following format: `CSERVER1`. The port number must be the same at the client and the server, and default port number 1700 is used for

FELANIP. If required due to internal network circumstances, the port number at the server can be manually changed within a range of 1 to 65535 in cooperation with the network administrator – first in the `FELANIP.INI` file – and then entered here using the same value.

Figure 9 shows typical settings for a standard installation. At the same time, this entry starts the FELANIP server program at the local PC.

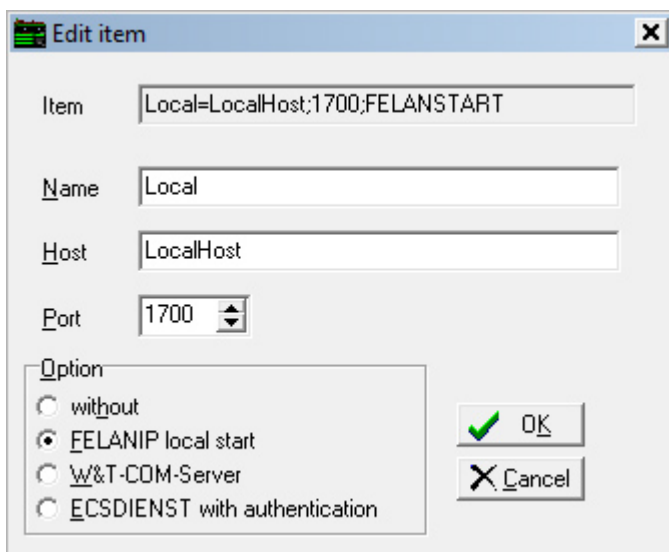


Figure 10

If a W&T COM server or an **ECS SERVICE** (ECSDIENST) with activated authentication needs to be addressed, the corresponding option needs to be activated due to differences in the data protocol. **ECS SERVICE** without authentication does not require the activation of any particular option. As a rule, the number of the data port at the W&T COM server is 8000.

2.1.4 Load Settings

Certain attributes can be restored the next time the program is initialized by activating this option which allows for saving the current user interface, e.g. position and size of a given document window. Curve type, color and scaling can be restored for documents used for the graphic representation of measured quantities. The program remembers the selected summator and appropriate channels, and restores the respective settings during initialization. If **ECswin** is initialized by means of a link which makes reference to an INI file, the saved

user interface is restored after the program is started and data transfer starts immediately. **ECSwin** can be configured to clear all user settings by activating the **Save settings** function after all client windows have been closed.

2.1.5 Save Settings

Certain attributes can be saved to the program's INI-File, e.g. the currently connected target host, as well as the position and the size of a given document window.

2.1.6 Serial Interface

This command activates the parameters configuring window used to enter the basic settings for the serial interface of the server program **FELANIP** which has been started at the same PC. The following parameters are included in this window: **Transmission speed**, **Parity** and **Port**. Transmission speed can be set within a range of **1200** to **115200** baud. Parity can be set to **even**, **odd** or **none**. Any **Port** from **COM1** to **COM8** can be chosen for connecting the PC to the summator or the modem (as long as the selected port is physically present). The **E-LAN TIMEOUT** setting determines the duration in seconds which elapses from the point in time at which the program detects an error in data transmission to the summator, on up until the point in time at which the error is processed. **Automatic balancing** may also be selected, which causes the program to detect the transmission speed which is being used by the summator, if no data are returned after transmitting a request. The **USB-RS232-Adapter** checkbox should only be activated if non-reproducible errors in communication with the ECS LAN occur, which might be traced back to faulty dynamic handling of Windows events – in particular where USB adapters are used on fast computers.

Changes to parameters do not become effective until the **Change** button has been activated, which may lead to an error message with reference to resources which are administered by the operating system (e.g. **Hardware not available** or **Interface cannot be activated**). Changed data are only saved by the server program after the save function has been explicitly activated (by means of the **Save** button). Saved changes are written to the **FELANIP.INI** file.

The **Modem** registry card contains entry fields for parameters required for data transmission via modem. These include a **Modem initialization string**, the **Dial command**, a **Dialing prefix**, the **Dialing time**, the **Redialing pause** and a selection field for either the pulse or tone **Dialing procedure**.

The modem initialization string is transmitted to the modem each time a dial command is issued, and configures the modem with the desired operating parameters. The phone number to be dialed is entered by the program at the end of the dial command. The program monitors establishment of the connection between the two modems during the selected dialing time. The resulting status information is displayed continuously.

Correct configuration of modem parameters is essential for successful data transmission. The following settings should assure reliable data transmission in combination with **SMARTY 14.4 TI** (Dr. Neuhaus) or **COURIER** (USRobotics) modems. Modems not listed below may require other parameter settings:

PC Modem:

SMARTY	COURIER	
&F	&F	default configuration
X3	X3	do not wait for dial tone before dialing (for operation at a PBX)
\Q1	&H2	software flow control, Xon/Xoff
	&I1	transmit Xon/Xoff to PC
\K4	&Y3	break: transmit all data from the buffer before break
Y1		clean break
\E0	E0	local echo off
	F1	local echo off for transmitted data
\N6	&M4	error correction
\T2		timeout error, 2 min.
%C1	&K1	data compression ON
&D0	&D2	normal DTR operation (PC indicates DTR)

Table 1

U1600 Modem:

SMARTY	COURIER	
&F	&F	default configuration
\Q1	&H2	software flow control, Xon/Xoff
	&I1	transmit Xon/Xoff to PC
%U1	&B1	Fixed baud rate (Transmission speed between PC and modem)
Y1		clean break
\E0	E0	local echo off
	F1	local echo off for transmitted data
\N6	&M4	error correction
\T2		timeout error, 2 min.
%C1	&K1	data compression ON
Q1	Q1	no messages from modem to terminal
S0=3	S0=3	respond after third ring
&Y0		profile '0' after power-up / DIP switches, USrobotics
&W0	&W0	store active profile as profile '0'

Table 2

Important: The U1600 modem must be configured (with the help of any desired terminal program) with the baud rate which will later be used for communication.

Configuring the modem at the PC:**SMARTY:**

Initialization string: AT&F\Q1\K4Y1\E0\N6\T2%C1&D0

Dial command: ATDT

COURIER:

Initialization string: AT&F&H2&I1&Y3E0F1&M4&K1&D1

Dial command: ATX3DT (X3 only when calling from a PBX)

Configuring the modem at the U1600:**SMARTY:**

AT\Q1%U1Y1\E0\N6\T2%C1Q1S0=2&Y0&W0

COURIER:

AT&F&H2&I1E0F1&M4&K1Q1S0=2&W0

The current modem configuration can be displayed with the help of a terminal program by transmitting the command **ATIS0** or **AT&V0**. Modem parameters need not be entered in the event that default settings are used. However, complete entry of all parameters may be advantageous, especially if the modem is used by other programs which might make changes to the default settings.

The phone number to be called can be entered to the **Dial** registry card. The phone number list can be edited with this registry card as well. New phone numbers can be entered to the list, and existing numbers can be changed or deleted. When the dialing procedure is started, the modem parameters and the selected phone number are transmitted to the modem, one after the other. After the local modem has established a connection with the remote modem, commands and data can be transferred via the telephone lines. If the modems are operated in the transparent mode, the dialing window can be closed. Information concerning the status of the connection is updated in the **ECSwin** status line once per second. During operation in the transparent mode, the duration of the call is displayed in seconds at the **ECSwin** status line. If the menu item **Dialing via modem** is activated once again, the dialing window reappears in the foreground and the call can be ended by clicking the **Disconnect** button.

2.1.7 Language

This menu item is used to select a language. The first time the program is started, the language which is used in the Windows environment is detected. **ECSwin** is always started with this language in the future. If a different language is selected, this setting remains active even after the program is exited. The **FELANIP** program includes an equivalent language selection option in the options menu.

2.1.8 Printer Set-Up

This command opens the **Printer set-up** dialog box. Any one of the printers available in the list can be selected, and its parameters can be configured. This dialog box is used in the same way as the standard Windows printer set-up dialog box, and provides the user with access to specific printer characteristics. Page format settings selected here are taken into consideration when printing out tables, graphics and other texts.

2.1.9 Exit

This command exits the program. All open MDI client windows are informed that the program will be exited and automatically save any changed data. The TCP/IP-connection which has been established by **ECSwin** is disconnected at the server. If the **FELANIP** program was used as a server, and if the **auto-exit** function has not been activated for this program, **FELANIP** is not exited and remains available for use by other programs. However, as long as **FELANIP** is active, the PC's serial interface which is used for data transfer to the summator **cannot** be made available to other programs!

2.2 The Terminal Menu

2.2.1 Terminal Window Functions

Communication with the **16xx** summator is made possible by this window with the help of **ECL** commands. There are two basic ways in which this window can be used: as an empty window to which **ECL** commands are entered with the keyboard, or as a window containing data which has been loaded from an existing **ECL** command file. A data file of this type might contain a series of **ECL** commands which are executed on a regular basis. In either case, the program intercepts activation of the **ENTER** key and subsequently transmits either the current line, or any selected text to the server. If the selected text includes line breaks, the text is broken down and transmitted line by line.

At first, the **Terminal** menu includes two functions only:

- **New**: opens an empty terminal window.
- **Open**: loads an existing command file to the terminal window.

If the terminal window is the active document, four additional terminal menu functions are made available, and the **Edit** menu is added to the menu bar. The following functions can be executed with the additional functions in the **Terminal** menu:

- **Close**: closes the active terminal window.
- **Save** and **Save as**: saves data from active command files.
- **Print**: prints current window content.

2.2.2 New

This command opens an empty terminal window. This window allows for communication with any desired summator within the ECS LAN, assuming the user has adequate knowledge of the ECL language. Summator parameters can thus be configured, and energy data can be queried. Commands are transmitted each time the **ENTER** key is activated. If text has been selected, all of the selected text is transmitted. Otherwise, only the line is transmitted in which the mouse pointer is positioned. Incoming data from the summator are always written line by line underneath previously existing text. The current mouse pointer position (line and column), and the length of the current line (the maximum line length for ECL commands is limited to 128 characters) are displayed in the status line in the main program window.

Standard Windows word processing functions are also possible within the terminal window. For example, data can be exchanged via the Windows clipboard with the functions **Cut**, **Copy** and **Paste**, the **Search** and **Replace** functions can be used to locate and replace specific character strings, data can be queried from or saved to data files and text can be printed out. As a special feature, this window is capable of automatically compensating for differences between the graphic representation of ASCII characters (data generated in the DOS environment), and Windows characters. All of these functions can also be accessed from a pop-up menu.

2.2.3 Open

A predefined sequence of commands can be loaded to the terminal window with the **Open** command. The command opens a dialog box which allows for access to various drives, directories and data files. The cursor can be moved to the desired line with the scroll keys or by clicking with the mouse. After the data file has been opened, commands can be transmitted by activating the **ENTER** key (see **Terminal|New**). An entire series of commands can be transmitted at once by selecting the corresponding text.

2.2.4 Close

This command removes the current terminal window from the monitor. The user is asked by the program if the command sequence or results data displayed at the monitor should be saved to a data file.

2.2.5 Save

The **Save** command writes the content of the active window to a data file. If no name has been assigned to the current document, the **Save as** dialog box is opened automatically allowing for the selection of a file name, a directory and a drive. Two predefined data formats are used for data files (these are recognizable by the corresponding data file name extensions **.TXT** and **.DAT**). When data is swapped, the **.DAT** extension provides for conversion to the DOS format.

2.2.6 Save As

This command opens the **Save as** dialog box which allows for the selection of a file name, a directory and a drive. If an existing file name is entered, the program asks the user if the existing data file should be overwritten.

2.2.7 Print

The **Print** command reads out the contents of the terminal window to the printer port. Selected characters sets, fonts and colors, as well as the selected paper format (portrait or landscape) are taken into consideration. The **Printer setup** command allows for the selection and configuration of a printer.

2.3 The Edit Menu

2.3.1 Edit Menu Functions

This menu is linked exclusively to the terminal window. It is only displayed as long as the terminal window is active. The commands included in the **Edit** menu allow for the exchange of data via the Windows clipboard. These commands include **Copy** and **Cut** for processing selected text, as well as **Paste** which is used to insert text from the clipboard to the current cursor position.

A **Search and Replace** function is included for locating and replacing user defined character strings. Beyond this, three special program components are available as well:

- Select the entire content of the terminal window
- Transmit a command sequence

- Interrupt the read-out of data from the summator
- Change the font or the font size.

2.3.2 Cut

The **Cut** command is used to delete selected text from the document, which is simultaneously saved to the Windows clipboard. The **Paste** command can be used to insert text copied to the clipboard into any desired document, or to a different position within the same document. The text remains on the clipboard and can thus be inserted repeatedly if desired.

2.3.3 Copy

The **Copy** command does not change the selected text, but it only copies it to the clipboard. The **Paste** command can be used to insert copied text into any desired document.

2.3.4 Paste

The **Paste** command inserts text from the clipboard to the current window at the cursor position.

2.3.5 Delete

This command is used to delete previously selected text from the terminal window.

2.3.6 Search

This command searches for a specified character string within the active window. The following options are available:

- **Search direction:** Search starts at the current position and continues either to the beginning or the end of the document.
- **Consider case:** Searches for a text string which corresponds precisely to predefined search criteria including upper and lower case letters.
- **Whole word:** Searches for the predefined character string as a single word. If the predefined character string is included in a longer word, it is not considered a match.

2.3.7 Replace

- **Replace**: Replaces the search text with the character string which has been entered to the **Replace with** field (this process can be repeated as often as desired).
- **Replace all**: Replaces all occurrences of the search text with the character string which has been entered to the **Replace with** field.

Additional search criteria described in the **Edit|Search** section apply as well. The **Search/Replace** dialog box remains active until it is closed with the **Abort** button, regardless of whether the **Search** or the **Replace** command is used. Matches which are found during the search process are highlighted, and editing options are offered if available.

2.3.8 Select all

The entire contents of the terminal window can be selected with this command. Selected text can then be deleted, copied to the clipboard or transmitted as a command sequence to a summator. Commands can also be executed with the corresponding icon in the toolbar.

2.3.9 Transmit

This command has the same effect as activating the **ENTER** key when working in the terminal window. If text has been selected, all highlighted text is transmitted to the summator. Otherwise, only the line is transmitted in which the cursor is currently positioned.

2.3.10 Interrupt Transmission

This function transmits a **Cancel** command (^X) to the server. **FELANIP** accepts this command immediately (the usual queue sequence is disregarded) and forwards it to the summator. All buffers and flags at the summator are reset, and current data transmission is interrupted.

2.3.11 Change Font

New default settings can be selected for font, font style (e.g. bold and cursive), font size and color as displayed at the terminal window. These settings apply universally to all text within the window. They also apply to print-outs. These settings do not remain active after the program has been exited, because special

formatting is not saved to the data files. A font with characters of equal width should be selected (e.g. `Courier New`), because fonts of this type generally provide best possible clarity.

2.4 The Configuration Menu

2.4.1 Configuration Menu Functions

The configuration menu includes a range of program components which support parameters configuration for U16xx summators. Data entry windows are provided for the following functions:

- Log on to the ECS LAN and configure access authorization
- Set the ECS LAN clock (time and date)
- Configure summator parameters
- Configure channel parameters
- Configure relay parameters
- Set meter readings
- Transmit any desired command sequences to the summator
- Create virtual channels
- Generate background programs for the optimization of energy consumption.

These data entry windows are all similar in appearance. A drop-down list appears at the upper left-hand corner of the window which allows for selection of the summator to be configured. The drop-down list includes all summators which are available within the ECS LAN. The ECS LAN summator which is currently active always appears in the field at the top of the list. Current parameters are read in and are entered to a table for editing (in the middle of the window). A different summator can be selected by opening the **Select summator** drop-down list. As a rule, a number of ECL commands must be executed sequentially in order to read in parameters from the summator, which may take several seconds. The status of this procedure is displayed as a bar graph at the upper right-hand corner of the dialog which indicates degree of completion. The mouse pointer is displayed as an hourglass until data transmission has been completed. If a summator other than the one at the top of the drop-down list is to be configured, it is not necessary to wait until data transmission has been completed. A new summator can be selected while parameters are being read in from the original summator, after which the program immediately starts to read in data from the new summator. Original data read in from the summator remain intact until they have been overwritten with new parameters. The changed parameters are read back each time a change is made. Some of the data entry windows (**General parameters**, **Channel parameters**, **Relay parameters** and **Meter readings**) include a

Changes registry card which displays the status of entered changes. This display appears in ECL syntax.

Buttons for the activation of important functions are displayed at the bottom of the data entry window. The **Transmit** button transmits all changed parameters (and only changed parameters) to the selected summator. The **Exit** key is used to close the current data entry window (a security acknowledgement is required). The **Open** and **Save** buttons can be used to write parameters to a data file. These files contain tables which use the tabulator character (ASCII: #9) as a delimiter between the data fields. These data can thus be loaded directly to Excel spreadsheets by using the standard Excel conversion function.

As a rule, data are displayed in tables (similar to Excel spreadsheets). This allows for easy access to all included data elements. The program runs plausibility tests during manual data entry. For example, testing is performed on certain channel parameters for which only a limited number of conditions may be entered (e.g. ON or OFF), as well as for convertibility of numeric data fields.

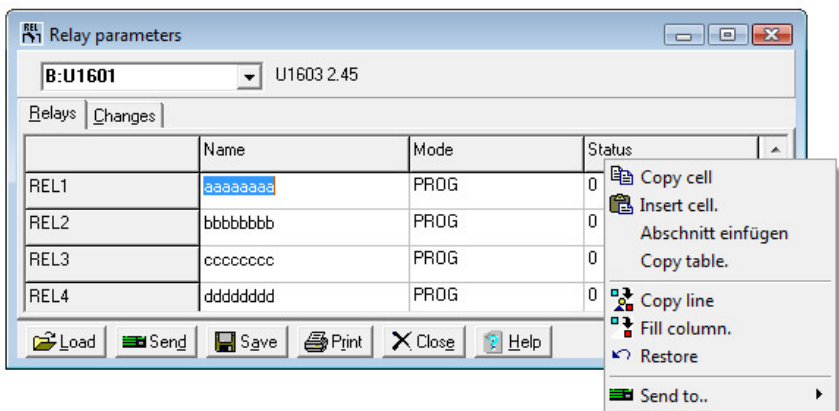


Figure 11

All data entry windows are linked to a pop-up menu (click right mouse key with mouse pointer on the data entry window), which currently supports the following functions:

- **Copy cell:** Copies the content of the current cell to the clipboard.
- **Paste cell:** Overwrites the contents of the current cell with the data from the clipboard.
- **Copy table:** Copies all table data to the Windows clipboard, from which they can be entered directly to an Excel spreadsheet.

- **Copy lines:** Opens a dialog box which allows for the selection of a range of lines (consisting of two or more lines), which is then overwritten with the contents of the source lines.
- **Fill column:** Fills the entire column with the content of the current cell.
- **Restore:** Restores parameters to a summator from a data file.
- **Transmit to:** Allows for the selection of a summator to which current parameters can then be directly transmitted (e.g. for copying parameters from one summator to another).

Due to the fact that large numbers of data fields are frequently administered within a table, a copy of the original parameters is saved to memory. In this way, only those entries which have been changed need to be restored, which saves considerable time. Beyond this, a comparison is always made when displayed data are about to be changed (by means of uploading from another summator or a data file), or when the data entry window is closed, in order to determine if any of the cells within the table have been changed. If changes are detected, a dialog box is opened which offers the following options:

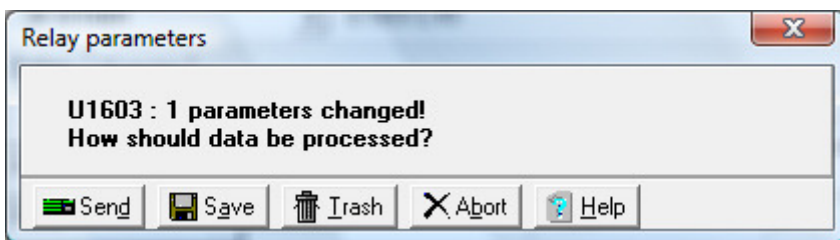


Figure 12

If the **Transmit** button is activated, the changed parameters are transmitted to the summator. The parameters can be written to a data file by activating the **Save** button. The **Trash** key closes the dialog and all changes are aborted. The dialog box can be closed with the **Exit** key, and **Abort** returns the display to the parameters configuring data entry window.

When data are transmitted from the table to the summator, the number of individual commands to be transmitted is minimized by only transmitting data which has been changed, and by combining identical parameters to a single command (e.g. **URATIO 1+5..8+20 = 10**). If one or more parameters have been changed, the content of the effected column is always read in and displayed. This allows the user to make sure that the desired changes have been successfully entered to the summator.

The help texts from the firmware installed to the summator can be accessed in addition to **ECSwin** online help. The toolbar includes a button with a question mark. Clicking on this button changes the mouse pointer into a question mark.

The corresponding help texts stored to the firmware at the summator can be queried by clicking with the question mark pointer on elements within the window (text elements, table columns etc.), which have been linked to an ECL command. The help texts are displayed in their own windows. The mouse pointer then resumes its normal function and online help is deactivated. This button is only available within the toolbar if a corresponding MDI client window is currently active in **ECSwin**.

2.4.2 Logon and Administration of User Access Authority

This window is used for the administration of authorization for access to summators within the ESC LAN. Differentiation is made between two different types of access authorization, namely access to data at the summator which has been connected to the server (local summator), and access to all other summators within the ECS LAN. The entries described below regarding password, access authority and timeout period take effect on the local summator only.

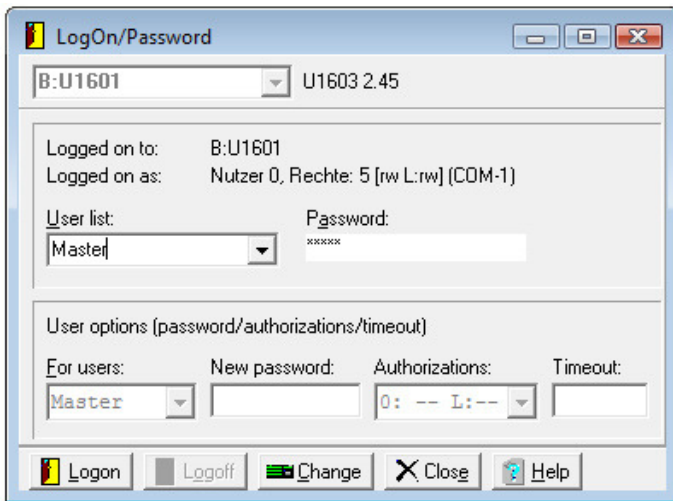


Figure 13

ECSwin does not have its own password here. Only those security functions which have been configured at the summators are managed by checking the plausibility and the order of the entries before the respective command is transmitted to the summator, and before **ECSwin** generates a logon command. Passwords are encrypted for display at the monitor. It must be observed that responses provided by the summators in the ECS LAN are influenced by the

access authorization possessed by the user. Special care must be taken if the password is changed, as well as when access authority is assigned, because communication with the summator may become impossible in extreme cases (e.g. if the master password is unknown and if all access authority has been disabled).

Access authority to the ECS LAN can be assigned to up to 5 users (the master plus users 2 through 5). Numbers ranging from 1 to 999999999 can be used as passwords. Differentiation is made between access authorization assigned to users for the local summator, and all other summators within the ECS LAN. A timeout period can be selected as an additional criterion (time in minutes). If no activity takes place during the selected timeout period, the user loses his access authority. After the timeout period has elapsed, or after the user has logged off, the access authority entries recorded at the master apply to all access operations until the user logs back on again.

The master user always possesses **maximum possible access authority**, even if read and write authority have not been assigned. He is able to change the passwords, the access authority and the timeout periods for all other users. The standard users (users 2 through 5) are only able to change their own passwords. The access authority entered for the master determines system performance when **no** user is logged on (e.g. during program initialization, after logoff or after the time-out period has elapsed).

Access authority levels ranging from 0 to 5 can be assigned. Level 0 allows for neither read nor write access to any of the summators, and level 5 allows for maximum access authority to all of the summators within the ECS LAN:

Level	Local Summator		ECS LAN Summators	
	Read	Write	Read	Write
0	no	no	no	no
1	yes	no	no	no
2	yes	no	yes	no
3	yes	yes	no	no
4	yes	yes	yes	no
5	yes	yes	yes	yes

Table 3

The **Login/Password** window is divided into two parts. **Login command** data are entered to the upper portion of the window (user number and password). Current user parameters can be edited in the lower portion (password, access authority and timeout period). The lower portion is only enabled by **ECSwin** if the master user has logged on to the system. Otherwise, standard users are only able to change their own password. If the master user is logged on and no

entry has been made to the **New password** field, only authority levels and timeout periods can be changed.

2.4.3 Date/Time

The same basic working procedures apply here as is the case with the **Configuration** menu. Date and time can be set with this data entry window either for the selected summator, or for all summators throughout the entire ECS LAN.

The screenshot shows a window titled "B:U1601" with a dropdown menu set to "B:U1601" and a version number "U1603 2.45". The window is divided into several sections:

- Summator date/time:** Displays "06.10.08 11:01:49".
- Background program:** A text field containing "0".
- Current background program:** A text field containing "H 0=".
- Time synchronization for all network clocks:** A text field containing "H 0='if 0h0.15, ALL-, Datum~/=/x.x.x x:x.x'".
- Send to:** Two radio buttons: "Current summator" (selected) and "All summators".
- Select time:** Two radio buttons: "Computer time" (selected) and "manual".
- Correct date manually:** A text field containing "06.10.08".
- Correct time manual:** A text field containing "11:04:20".

At the bottom, there are four buttons: "Time/Date", "Program", "Close", and "Help".

Figure 14

Time from the selected summator's clock is displayed at the top of the window. The fields **Send to** and **Select time** allow for determining which summators will be set to which time and date. With the **Send to** field, the user decides whether time and date will be set at the selected summator only, or at all summators within the ECS LAN. The summator or summators can be synchronized to the PC's clock, or time and date can be set manually with the **Date** and **Time** entry fields at the right-hand side of the window.

A background program is displayed at the middle of the window which synchronizes all of the clocks within the ECS LAN on a daily basis. The background program synchronizes time every day at 00:00:15. The number of

the background program can be selected by the user by scrolling up or down in the numeric field, which restricts entry to a specified range and displays the respective background program from the summator if the number is changed. This prevents inadvertent overwriting of important programs. The background program is transmitted to the summator by activating the **Program** button.

2.4.4 General Parameters

The same basic working procedures apply here as is the case with the **Configuration** menu.

General parameters

B:U1601 U1603 2.45

Parameters Changes

Identification
Summatgr name: U1601
Group name: ECS4
Language: German
Date format: dd.mm.yy

Interval
Interval duration: 15 minutes
Interval source: 99: Time

Tariff
Tariff source: 100:Prog
Tariff unit: EUR
Tariff fixed point: 1

Cost factors
Cost factor T1: 1
Cost factor T2: 0.1

Other
Level: 1
Status check: 1

Beginning variable
Beginning of a day: 00:00:00
☐ Beginning variab
Begin (day of the month): 1
Begin (month of the year): 1

Load Send Save Print Close Help

Figure 15

The following summator parameters can be configured with this data entry window:

Station (device), group, dateformat, language, interval, intervalsource, tariffsource, tariffunit, tariffix, costfac1, costfac2, level, statuscheck, daybeg, monbeg

Some of the parameters are entered by means of drop-down list, allowing the user to make his selection from a prescribed list of values. Parameters can also be entered as text in the event that an unlisted value needs to be entered in a special case. After each change is made, the changed parameters are read out for double checking.

The following restrictions apply if parameters are to be configured with the help of data which have been saved to files generated for the completion of recurring tasks: The name of the document, the name of the summator and the date and time the file was created appear as the first line in the data file. Lines containing data consist of the name of the ECL command and the current parameter, which are separated by the tabulator character (#9). The data file is recognized as valid if it contains at least 12 lines, and if the name of the document is detected in the first line. The following general layout is conceivable:

General Parameters - B1:Analog -		01.09.1997 10:41
Station		WAREHOUSE
Group		ECS
etc.		

Table 4

The file name extension **.ALL** is used by the program as a default for general summator parameters. However, any extension allowed by the operating system is possible.

2.4.5 Channel Parameters

The same basic working procedures apply here as is the case with the **Configuration** menu. The main portion of the data entry window contains a table, which includes the basic parameters for all channels (physical and virtual). The number of channels, as well as the number and content of the table columns depends upon the type of summator whose parameters are currently being edited. If the current summator type is capable of processing analog signals (e.g. **U1601** or **U1615**), a second registry card appears which is laid in a fashion which is suitable for these special parameters. An additional table is included for summators with LON interface (**U1601**, **U1602** and **U1603**).

The screenshot shows a software window titled "Channel parameters". At the top, there are dropdown menus for "B:U1601" and "U1603 2.45". Below these are tabs for "Meter inputs", "Multi-functional inputs and outputs", "LON-parameters", and "Changes". The main area contains a table with 11 rows (CHN1 to CHN11) and 12 columns. The columns are: Name, MConst, URatio, IRatio, EUnit, PUnit, PFac, Pulse, CFix, Edge, OnOff, StSt, and Format. The table is populated with various channel names and numerical values. At the bottom of the window, there are buttons for "Load", "Send", "Save", "Print", "Close", and "Help".

	Name	MConst	URatio	IRatio	EUnit	PUnit	PFac	Pulse	CFix	Edge	OnOff	StSt	Format
CHN1	P_16_2/3	100	1	1	MWh	MW	3600	50	2		✓	✓	✓
CHN2	Q_16_2/3	100	1	1	MWh	MW	3600	50	2		✓	✓	✓
CHN3	Uf_823	100	0	0	MWh	kW	3600	50	2		✓	✓	✓
CHN4	Gen_1	100	0	0	MWh	kW	3600	50	2		✓	✓	✓
CHN5	Uf_146	100	0	0	MWh	kW	3600	50	2		✓	✓	✓
CHN6	Gen_2	100	0	0	MWh	kW	3600	50	2		✓	✓	✓
CHN7	Uf_156	100	0	0	MWh	kW	3600	50	2		✓	✓	✓
CHN8	Gen_3	100	0	0	MWh	kW	3600	50	2		✓	✓	✓
CHN9	P_16_2/3	100	1	1	MWh	MW	3600	50	2		✓	✓	✓
CHN10	P_16_2/3	100	1,1	1,1	MWh	MW	3600	50	2		✓	✓	✓
CHN11	P_16_2/3	100	1	1	MWh	MW	3600	50	2		✓	✓	✓

Figure 16

The following channel parameters can be configured with this data entry window:

ChannelName, Mconst, Urat, Irat, Eunit, Punit, Pfactor, Pulse, Cfix, Edge, OnOff, StartStop, Format

Lname, Cmode, LonID, LonType, LonFac, LonOff, LonChn, LonStop

AnaModID, AnaMode, AnaFactor, AnaOffset, AnaReso, AnaUnit, AnaUSel, AnaSSel

One parameter is assigned to each of the columns within the table (only those parameters appear which are actually present at the current summator), and one channel is assigned to each line (number of channels is variable).

The program immediately examines values for data convertibility during data entry when the cursor is moved from one line to another or from one column to another (for data entry fields to which characters can be freely entered). If conversion is not possible, **NC** appears in the cell (**n**ot **c**onvertible). Entry values are predefined for other cells which are linked to parameters which only allow for a restricted number of possible entries. Each key activation or double click with the mouse advances the display to the next possible parameter.

The following parameters are examples of this selection procedure: The **Edge** column only allows for selection of either a symbol which represents a **high-low**, or a **low-high edge**. The following three columns (**OnOff**, **StartStop** and **Format**) only allow for entry of a 0 (empty) or a 1 (check mark). The **Cfix** column can be changed in steps of 1 from 0 to 3.

Due to the fact that changing the format parameter causes deletion of all interval data stored at the summator, the **Format** column is protected against inadvertent alteration. Changes do not become effective until after a security acknowledgement has been confirmed.

The parameters can be saved to a data file which is formatted as shown in the table below (including header).

Channel parameters -BI:Analog- 01.09.1997 10:48					
Channel	Channelname	..	mconst	uratio	format
C1	P_16_2/3		1000	1	1
C2	Q_16_2/3		1500	1	1
	:	..	:	:	
C31	VirtChan7		100	1	1
C32	VirtChan8		100	1	0

Table 5

The file name extension **.KAN** is used by the program as the default extension for channel parameters. However, any extension allowed by the operating system is possible.

Due to the fact that some summators have special attributes (**U1601**, **U1602**, **U1603** and **U1615**), the data entry window provides the user with additional registry cards in accordance with the requirements of the specific summator. The above procedures apply in principal to working with these registry cards as well.

These data are saved and entered for all summator types in the same way as the channel parameters. The file name extension **.ANA** is used for tables which contain parameters for analog read-in and read-out of measured quantities, and **.LON** is used for tables with LON parameters.

The **Open**, **Save** and **Print** buttons at the bottom edge of the window only affect the currently active table. The **Transmit** button effects all changed parameters in all tables.

The file name extension **.CHN** is used by the program for saving parameters from all available channel parameter tables to a single file. Data are stored line by line (with reference to a given parameter) and are separated with the tabulator character. When these data are read in, assignment to the table

columns is based upon the first entry in each line (up to the next tabulator character), which must correspond to the header for the table column.

2.4.6 Meter Readings

The same basic working procedures apply here as is the case with the **Configuration** menu. Meter readings for the various channels can be set directly with this window:

ETot, ETotT1, ETotT2

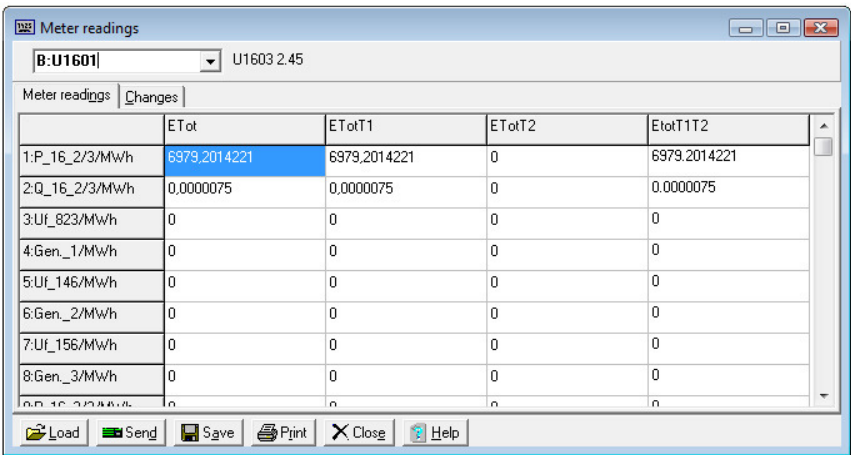


Figure 17

The data entry window is laid out such that the each column is assigned to an individual **ECL** command, and each line represents a channel. The program immediately examines values for data convertibility during data entry when the cursor is moved from one line, or from one column to another. If conversion is not possible, **NC** appears in the cell (not convertible). The ETotT1T2 column displays a calculated value (calculated by the summator) which results from the values in the two columns to its left, and which thus cannot be set directly.

The parameters can be saved to a data file which is formatted as shown in the table below (including header).

Meter readings -B1:Analog- 01.09.1997 10:11

Name	ETot	Etot T1	Etot T2
1:P_Tr1/kWh	308.387	290.393	17.994
2:S_Tr2/kWh	61.000	61.000	0.000
	:	:	
31:ViChn7/kWh	921.647	920.447	1.200
32:ViChn8/kWh	0.000	0.000	0.000

Table 6

The file name extension **.ZAH** is used by the program as the default extension for meter readings. However, any extension allowed by the operating system is possible.

2.4.7 Relay Parameters

The same basic working procedures apply here as is the case with the **Configuration** menu. Relay parameters can be configured, and relay conditions can be set directly with this data entry window (number of relays depends upon type of summator):

RelayName, RelayMode, Relay

REL Relay parameters

B:U1601 U1603 2.45

Relays Changes

	Name	Mode	Status
REL1	aaaaa	PROG	0
REL2	bbbbbb	PROG	0
REL3	ccccccc	PROG	0
REL4	ddddddd	PROG	0

Load Send Save Print Close Help

Figure 18

The data entry window is laid out such that the each column is assigned to an individual ECL command, and each line represents a relay. The number of lines corresponds to the actual number of available relays. The **Name** column allows for the entry of freely selectable text, and a selection within a range of 0 to 2 and 0 to 1 respectively can be made for the **Mode** and **Status** columns.

The parameters can be saved to a data file which is formatted as shown in the table below (including header).

<i>Relay parameters -B1:Analog- 1.09.97 11:09</i>			
<i>Relay</i>	<i>Name</i>	<i>Mode</i>	<i>Status</i>
Rel1	Press	1	1
Rel2	Motor	1	0
Rel3	Transformer	1	1
Rel4	Heater	2	1

Table 7

The file name extension **.REL** is used by the program as the default extension for relay parameters. However, any extension allowed by the operating system is possible.

2.4.8 Command Transmission

This window is used for the transmission of any desired commands and allows for the configuration of a summator based upon **ECL** commands which have been saved to a data file. This type of parameters configuration can be used regardless of the type of commands involved. However, they should generally be commands used for the configuration of U16xx summators. A parameters configuring data file could be laid out as follows:

```

Station           = WAREHOUSE
Group             = ECS
Interval          = 15 minutes
                  :
Uratio 08         = 100
                  :
Iratio 04         = 100
                  :
Unit 18           = MWh
Unit 19           = kWh
                  :
RelayName 01      = MOTOR
etc.
```

Table 8

After the file with the command sequence has been opened, a table with two columns appears. The left-hand column contains the commands which are to be transmitted to the summator, and any response messages from the summator are written to the right hand column (e.g. syntax error messages). The fixed column at the far left contains information concerning the line number and the length of the corresponding command.

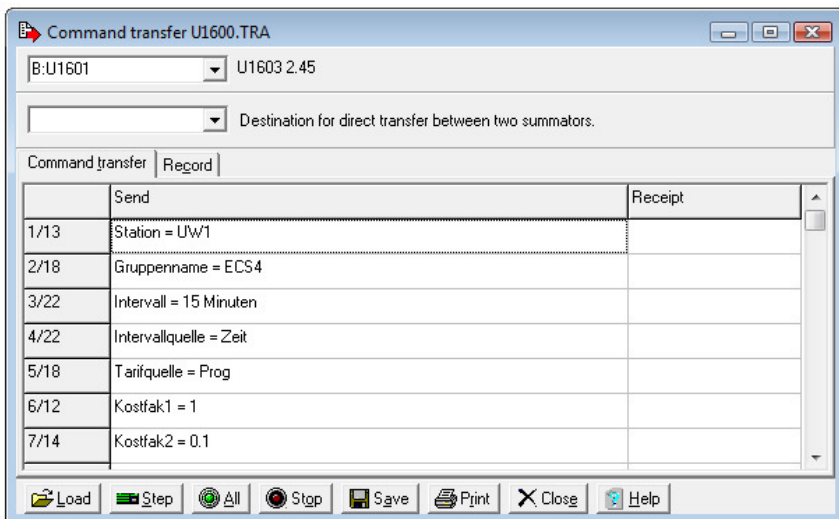


Figure 19

Data is always transmitted to the current summator which has been selected in the summator drop-down list. The cells in the **Send** column can be edited, and the changes can be saved to memory as a data file. The table can be expanded with the **Add lines** command included in the pop-up menu, or reduced with the **Delete lines** command. The line number in the fixed column at the far left can be updated with the **Refresh table** command (e.g. after lines have been added or deleted).

Data transmission is controlled with three buttons including **Step**, **All** and **Stop**. If the **Step** button is activated, only the current line is transmitted to the summator. All of the lines can be transmitted to the summator, one after the other, by activating the **All** button. If a transmission has been started with the **All** button, it can be interrupted with the **Stop** button. Transmission always begins with the current line (the line in which the cursor is positioned). Data transmission can be started and stopped at any desired point.

A special feature is provided with the **Record** checkbox at the upper edge of the window. If this function is activated, data returned by the summator is recorded to the TRANSFER.TXT data file. If a file with this name already exists, it is overwritten without warning. This option is intended for saving responses to query commands. The following table provides an example:

Channel 1..3	ChannelName 01 = P_50
	ChannelName 02 = total
	ChannelName 03 = Uf_823
MConst 1..3	MeterConstant 01 = 100
	MeterConstant 02 = 100
	MeterConstant 03 = 100

Table 9

Only the respective first line is displayed in the right-hand column, although all of the data is recorded to the file. These results can be loaded to the left-hand column by opening the `TRANSFER.TXT` data file after the first step has been completed, and can then be transmitted to another summator. The `TRANSFER.TXT` data file is a temporary file. If the results need to be saved, the user must rename the file in order to archive the data.

An additional drop-down list with all of the summators within the ECS LAN is displayed in this window. If a summator has been selected here, and if the selected summator is different than the summator selected at the first drop-down list, a direct transfer of parameters and data from one summator to the other within the ECS LAN is possible (without any detour via the PC). Certain placeholders must be entered into the command lines in this case, which are replaced with the IDs of the selected summators during execution of each of the lines by **ECSwin**. ID **XX**: is thus replaced by the ID of the summator which has been selected in the upper drop-down list, and ID **YY**: by the ID of the summator selected in the lower drop-down list.

The command lines might appear as shown in the following example:

```
1,32,fori,i,dup,xx:channel- .,yy:channel .=$,ni,! "OK"
1,32,fori,i,dup,xx:EUnit- .,yy:EUnit .=$,ni,! "OK"
1,32,fori,i,dup,xx:PUnit- .,yy:PUnit .=$,ni,! "OK"
:
1,32,fori,i,dup,xx:AnaMode- .,sw,yy:AnaMode .=$,ni,! "OK"
1,32,fori,i,dup,xx:AnaReso- .,sw,yy:AnaReso .=$,ni,! "OK"
1,32,fori,i,dup,xx:AnaUnit- .,sw,yy:AnaUnit .=$,ni,! "OK"
:
1,4,fori,i,dup,xx:reln- .,yy:reln .=$,ni,! "OK"
1,4,fori,i,dup,xx:relmode- .,sw,yy:relmode .=$,ni,! "OK"
1,4,fori,i,dup,xx:rel- .,sw,yy:rel .=$,ni,! "OK"
:
1,32,fori,i,dup,xx:etot- .,sw,yy:etot .=$,ni,! "OK"
1,32,fori,i,dup,xx:etott1- .,sw,yy:etott1 .=$,ni,! "OK"
1,32,fori,i,dup,xx:etott2- .,sw,yy:etott2 .=$,ni,! "OK"
:
0,32,fori,i,dup,xx:p-! .,yy:p .=$,ni,! "OK"
0,32,fori,i,dup,xx:h-! .,yy:h .=$,ni,! "OK"
```

The sample command sequences shown above are used for the transmission of channel parameters, meter readings and programs (H and P programs) from one summator to another. The `fori` loop transmits the parameters from the source summator to the destination summator, one after the other, via the command interpreter stack. The type of parameter (e.g. character string for `channel name` and numeric for `MConst`) must be taken into consideration to assure that parameters are read from the stack in the right order (e.g. `sw` for `AnaMode`). When **OK** is read out at the end of the line, **ECSwin** is informed that processing of the line has been completed, and that the next line can be transmitted.

The preferred file name extension is **.TRA**, although any extension allowed by the operating system is possible.

2.4.9 Virtual Channels

This program component is used to create virtual channels. Two lists are included in the window. The left-hand list shows the names of the channels for the currently selected summator (source channels). The entries in this list can be selected with the left mouse key, or with the space bar. Generally speaking, a new selection clears the previous selection. However, If the shift key is pressed and held, a range of entries (from to) can be selected within the list, and if the Ctrl key is held and depressed, single entries can be added to the current selection at will (e.g. for the selection of non-consecutive entries).

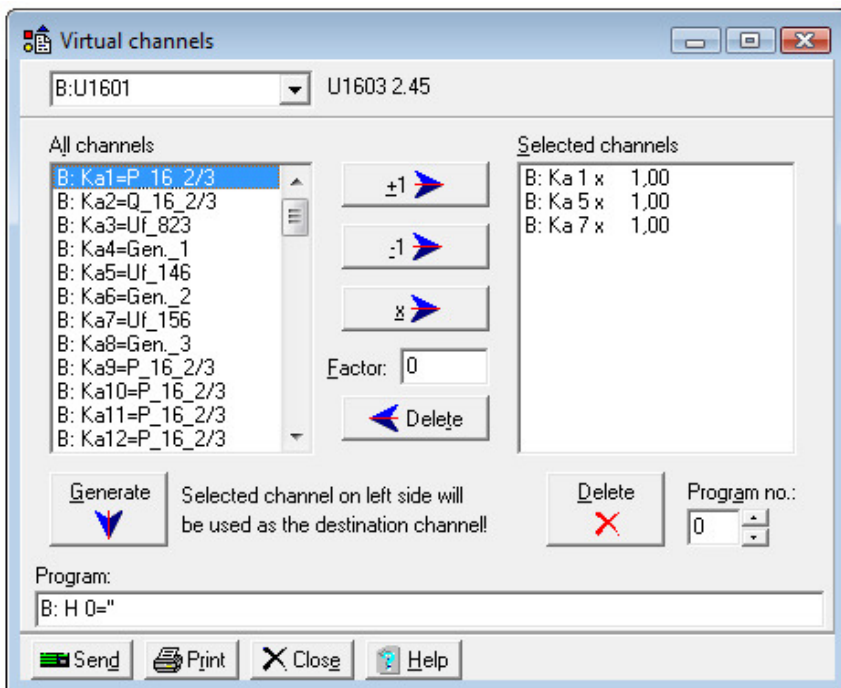


Figure 20

The buttons between the two lists are used to move the channels into the destination list (which is later used as a basis for the generation of the command line). Depending upon which button is used, different weighting factors are applied (+1, -1 or the factor displayed in the data entry field underneath the **x**► key). The key with the ◀ arrow enables the user to remove channels which have been inadvertently moved into the destination list. The entries in the right-hand list remain unchanged when a new summator is selected. This allows for the creation of virtual channels beyond the physical limits of the summator. The data entry field for the number of the background program determines which background program is to be used for the calculation of virtual channel data. Reference to the background program with this number is kept up to date by the program, i.e. if a background program with the selected number exists, it is displayed for control purposes. Before the command line is finally created with the **Generate** button, an entry from the left-hand list must be selected as a destination channel for generation of the virtual channel.

A command line might appear as follows:

```
H0='A:DVSUM 6+7, A:DVSUM 10+11 5.5, A:DVIRT V1='
```


Due to the fact that the generated command line is written to a text entry field, manual correction is possible before the line is transmitted. When the **Transmit** button is activated, the command line is transmitted to the current summator as a background program.

2.4.10 Optimization with ECSopt

The optional available **ECSopt** optimization program expands the functionality of the U16xx **E**nergy **C**ontrol **S**ystem manufactured by GOSSEN-METRAWATT. The programming language provided with **ECS** for the creation of user-specific programs makes it possible to influence the load curve of the energy consumer being monitored by the system, such that expensive peak loads can be avoided during consumption of electrical energy from the power supply system.

In addition to current electrical quantities from the main meter channel, the available breaking power of interconnected consuming devices can be taken into consideration in the optimization as a fixed quantity, or as a quantity which can be acquired with a meter channel. All of the possibilities available for the creation of virtual channels for the summation of several meter channels within the U16xx system can be taken advantage of. Generally speaking, all of the system's functions remain intact. Control of energy consumers is accomplished with the (four) relay outputs included with the basic instrument. If a relay has been activated during the course of optimization, it can be released (switched back to its original condition) either after an adjustable lock-out time which is valid for all relays, or at the end of the respective (e.g. 15 minute) interval period.

The utilized optimization algorithm is laid out such that the power limit value is observed when a relay is activated. Activation of subsequent relays only becomes necessary if remaining power from all other energy consumers is greater after the switching operation than it was at the moment the relay was activated. If always influencing (switching off) the same energy consumer as a result of optimization needs to be avoided, the subsequent relay can be treated as the first, after a switching operation has ensued (rotation method).

Significant power characteristics provided by optimization include:

- Control of up to four (U1601: six) relays for influencing consumed power
- Available power of the energy consumers influenced by the relays is taken into consideration as a fixed value, or as an instantaneous power value from active meter channels.

- Variable lock-out times for the beginning of optimization at (15 minute) intervals, as well as for the possible release of optimization relays after switching has ensued
- Tariff-related limit values for interval power are taken into consideration.
- The relay switching sequence can be rotated.
- Relay contact pre-travel time can be predefined in order to take response times from controlled devices into consideration, or for the read-out of advance warning messages.
- A report regarding all switching operations can be read out to a printer connected to the summator.

All of the parameters required for optimization are configured with a special data entry window. When the optimization window is opened, or when a different summator is selected, all existing programs (H and P programs from the respective summator) are analyzed, and the current optimization parameters are written to the window.

Optimization

B:U1601 U1603 2.45

Standard Add-on Triangle

Optimization channel: P_16_2/3/MW Lock-out time: 10 sec. Rotation: ☐

Power parameters: 1

	Relay 1	Relay 2	Relay 3	Relay 4
Relay name:	aaaaaaa	bbbbbbb	ccccccc	ddddddd
Breaking capacity:	100.00	100.00	0	0
Making capacity:	0	0	0	0
Pre-run time:	0	0	0	0
Minimum breaking time:	0	0	0	0

Time parameters: Making logic: ☐ forward ☐ reverse ☒ none

	Validity	Tariff change	PMAx	Condition (ECL)
1.	Mo-Sa	00:00	2000.00	

Load Send Save Print Close Help

Figure 21

The **optimization channel** (as a rule the primary energy import channel) is the channel whose energy consumption is to be optimized. Any desired physical or virtual channel from the current summator can be selected. The channel is selected by scrolling through the channel numbers at the optimization channel window, after which validity of the selected channel is verified. The name and the power unit of measure for this channel are maintained. The power unit of measure applies for all power entries made to the window. All meter channels utilized for optimization must be configured with the same power unit of measure.

If required, a lock-out time can be assigned for the activation of the optimization algorithms within a (15 minute) interval. This value is entered to the corresponding data entry field in seconds.

Relay-dependent optimization parameters can be entered to the **Relay parameters** table. The **Breaking power** and **Making power** parameters assigned to each of the relays can be entered either as a fixed value (e.g. 300), or as a function of instantaneous power from a physical channel (K1..K32, U1601: K1..K64) or a virtual channel (V1..V8). The channel can also be used to provide information as to whether or not the energy consumer is active. In this case, the following form is used for the entry Kk:fixed value (e.g. K10:800).

If a reduction of energy consumption caused by the activation of a relay occurs in a time delayed fashion, this delay must be entered as **Pre-travel time** in seconds. Pre-travel time can also be used for the implementation of time staggered warning messages prior to the shutdown of an energy consumer which will be caused by the next relay.

If the electrical system to which the energy consumers are connected demonstrates substantial power fluctuations, the assignment of a **Minimum breaking time** (entered in seconds) may be advisable. If all parameters for a given relay are set to zero, the affected relay and all subsequent relays are not used for optimization.

Tariff settings can be controlled with the **Time parameters** table. The days on which tariff switching is to take place can be entered to the first column. Possible alternatives include: **Mo-Su**, **Mo-Sa**, **Mo-Fr** or one day of week. The next column indicates the time of day at which switching to a new maximum power value is to take place. The value in the **Pmax** column represents maximum available (or “ordered”) mean power within the (15 minutes) interval.

The following column allows for control of tariff settings with the help of special conditions. This column only may contain **Conditions** as ECL commands or can be empty. Entry field **Condition** must be treated with special care, because **ECSwin** can only exercise limited tests over these entries. Given character

strings are added to the background program at the selected summator, and may only be allowed create a value within the command interpreter stack which can be processed in a logical fashion with the **ECL IF** command. E. g., the input **IN-6** causes the tariff setting on given time only if the channel 6 is on HIGH status.

A pop-up menu can be opened with the right mouse key from within the **Time parameters** table, which allows for expansion or reduction of the size of table by changing the number of conditions to be entered. Upon activation of the **Test** function in the menu, **ECSwin** tests the parameters which have been entered to the table. The sequence of the rows is modified as required for subsequent program generation. Mutually exclusive conditions are placed at the end of the table and the cursor is moved to the first non-interpretable line. If a problem exists, a corresponding message is generated and entered as a title for the table, which is displayed in red. The same test is performed if the table loses focus.

Min. 1, max. 14 rows are required. By pushing the **Send** button, the correct value of PMAX is activated on the summator immediately.

The **Making logic** entry field allows the user to determined whether relay making operations should be carried out in the same order as the breaking operations (forward), in the reverse order (reverse) or not at all (none).

The screenshot shows the 'Optimization' window with the following configuration:

- Device:** B:U1601 (selected), U1603 2.45
- Tabs:** Standard, Add-on, Triangle
- Message to:** COM1 (radio), COM2 (radio)
- Relay name:** ☒
- Shutdown:**
 - Accompanying: OFF
 - Command: A19.4,*
- Start-up:**
 - Accompanying:
 - Command:
- PMOM optimization channel:** ☒
- Time display:** ☒
- Smooth PMOM:** ☐ 5 (min. smoothing time[s])
- Other PMOM channel:** ☐ Channel no.: 1
- Examples:**
 - Example, shutdown: (Click)
 - Example Switch-on: (Click)
- Buttons:** Load, Send, Save, Print, Close, Help

Figure 22

The **Add-on** registry card allows for the configuration of printer options for reports which can be printed out by activating a relay. For example, a printer with serial interface can be connected to the summator for the generation of reports concerning switching operations. Either the first or the second serial interface at the summator can be used for read-out. If **COM2** (Tx2) is used, the transmission parameters for this interface must be configured separately, and if **COM1** (Tx1) is used, no read-out is possible as long as the interface is processing other queries, for example from an open **ECSwin** control panel. Generation of the output string is executed in conformance with the checkbox configuration and the text entry fields. A command or a command sequence from the ECL command set (e.g. **A2** or **A2,900,/) can be entered to the **Command** field, which pushes a message output value to the stack. Two display fields are located at the bottom of the registry card which can be used to test the currently configured print programs. If one of these fields is clicked, **ECSopt** generates the corresponding program, transmits it to the summator and displays the results.**

With some of the billing meters used by the electrical power utilities, pulses transmitted by the meters are only available as pulse runs. Use of the instantaneous power value (Pmom) calculated by the U16xx for a channel of this sort is only possible to a limited extent for optimization purposes. In this case, energy is evaluated in phases to allow for calculation of a trend.

If the required power value for the optimization channel is made available as a quantity for another channel (e.g. through the use of a special meter or a virtual summator channel), this can be taken into consideration by assigning another **Pmom channel** (K1..K32 or V1..V8, U1601: K1..K64 are allowable).

The power consumption profile of the optimization channel can be visualized at a given interval, and relay status can be displayed with the **Triangle** registry card. This function is activated with the **Start** button at the bottom left hand side of the window. Usable results can only be obtained if programs generated by **ECSopt** are running at the respective summator. The data required for graphic representation are read in from the summator cyclically. The graphic representation of power consumption is displayed in the form of a power triangle. The triangle resulting from the previous interval period (brown triangle) is successively overwritten with the triangle for the current interval (yellow triangle). The calculated power trend is displayed graphically and numerically. Power reserves are indicated numerically.

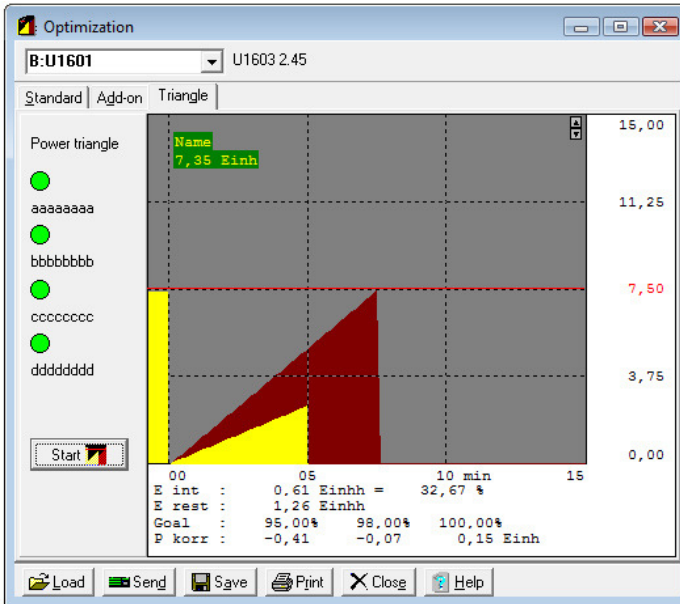


Figure 23

In working with **ECSopt** it must be observed that a portion of the available program resources at the respective summator must be available for optimization. The user must assure that the following are not otherwise currently in use:

- P programs: P0..P12, P16..P18
- H programs: H1..Hx (x = number of predefined tariff switching times +1), H16, H17
- A variables: a0..a4, a10..a19

If subsequent manipulation of the H and P programs generated with the optimization window occurs (e.g. via the terminal function or by means of overwriting with a generated program line from another **ECSwin** window), correct functioning of the optimization option cannot be assured by the software developer, **NET-TREND Fischer & Partner KG**. The user is urgently advised not to install resource-intensive programs to the summator which is utilized for optimization.

2.5 The Display Menu

2.5.1 Display Menu Functions

This menu includes the program components which are used for visualization of information and measurement data from the summators within the ECS LAN. These include:

- U16xx control panel
- ECS LAN network topology schematic
- Display of measurement values stored to the summators
- Continuous recording of current measured quantities.

As opposed to the program components included in the **Configuration** menu, these program components have no effect on parameters or data associated with the summators. They are used exclusively for the visualization of stored data and parameters. The only exception is U16xx control panel display function: parameters can be set with the controls included in this display, which are similar to the controls on the physical instrument. However, parameters configuration is best performed with the program components described in the **Configuration** chapter, because these provide the user with more advanced solutions.

Two of the above mentioned functions allow for the graphic representation of measurement values. As is the case with the various parameters configuring tables, the graphic representation of measurement values is based upon a single software component which assures uniform procedures during use of all of the graphic representation windows.

2.5.2 U16xx Summator Control Panel

This command can be used to display the U16xx summator control panel and all of its operating and display elements. The summator display and its status LED's appear (the number of lines in the display depends upon the type of summator), and access is provided to the control panel keypad. Graphic representation corresponds to the layout of the selected summator.

The summator name appears as a title at the top of the window. The display is refreshed once per second. A pop-up menu can be opened by activating the right mouse key with the mouse pointer on the display, which allows for access to special functions:

- Change current summator

- Open the U16xx menu (M key)
- Open setup menu (press and hold M key for >1 sec.)
- Shift (press ▲▼ simultaneously)
- Open basic display (Etot from channel 1)
- Delete data (opens the summator's deletion menu)
- Close window

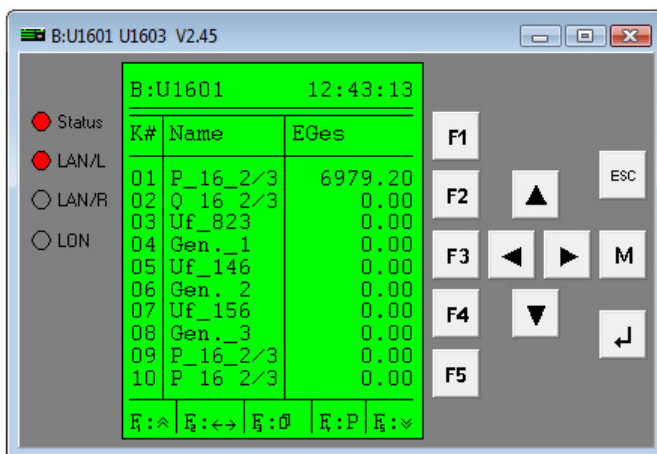


Figure 24

The control panel is operated by clicking on the displayed softkeys with the left mouse key (**F1...Fx**, the **scroll keys** and the menu key **[M]**). Instead of using the mouse, the corresponding keys at the PC keyboard can be used as well. However, due to the fact that Windows programs always assign the **F1** key to the online help function, the keys **1 ... x** at the numeric keypad on the PC keyboard are used instead of the function keys.

The status LEDs for the summator appear to the left of the control panel display (the number of LEDs depends upon the type of summator). If the mouse pointer is positioned at this portion of the window, a brief description of these elements is displayed. As a special feature, the four relay status displays in the U1600 panel can be switched. The corresponding relay is switched by clicking on the respective LED with the left mouse key. A relay switching command is generated by the program which is acknowledged with a short acoustic signal. The color of the respective LED is changed after a short delay, i.e. the next time the image is refreshed. Blinking LEDs can only be simulated to a limited extent, because the command used to query the display acquires an instantaneous image which is dependent upon random access in time.

2.5.3 LAN Topology

This command determines which summator is connected to the server, reads in a list of all neighbors to the left and to the right of all summators and generates a schematic diagram based upon this information which reflects the physical topology of the ECS LAN. Each summator is represented by a rectangle which contains the respective summator ID and type designation. Differentiation between left and right neighbors is visualized by positioning the connecting line to left-hand neighbors at the top edge (red line), and the connecting line to right-hand neighbors at the bottom edge (blue line).

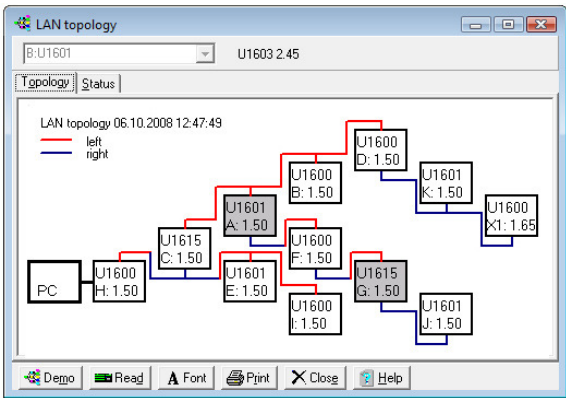


Figure 25

Additional information concerning any given summator can be displayed by clicking on the desired summator with the left mouse key. Important status information is displayed in the **Status** registry card, as is shown in the example below:

Summator:	R9:Sales [ECS]
ECS-U1615:	Software V1.51m (05.11.95)
Interval:	15 m (time)
Format:	32 channels, 962 entries(10.0 days), 962 used
Tariff:	T1 (program)
Relay:	R1:P R2:P R3:P R4:P
24 V output:	OK
Lithium bat:	OK
Status relay:	1 (OK), not coupled
Max.L-level:	0 (0:Lo...3:Hi)
COM1:	19200 baud, parity: off, protocol: XonXoff
COM2:	9600 baud, parity: off, protocol: --, MIX
BUS-L:	62K5 baud (4D), user L: 1(1),total: 2
BUS-R:	62K5 baud (2D+),user R: 0(0)

Table 10

The **Print** button prints out the currently active display. A pop-up menu is available for the **Status** registry card which allows for access to the usual text processing functions (e.g. copy to the clipboard etc.).

2.5.4 Energy / Power

Measurement data (e.g. annual, monthly, daily and interval data) can be read out from an U16xx summator and displayed in a table, or as a characteristic curve. Data can subsequently be saved to a file, and can be processed with other programs as well. Data is stored using a text format which utilizes the tabulator character as a delimiter between data elements. This assures that data can be imported to Excel spreadsheets and processed in a trouble-free fashion. Direct uploading of table contents can also be accomplished with the Windows clipboard.

Three registry cards are provided for the selection and display of measurement values. These include **Selection**, **Graphic** and **Table**.

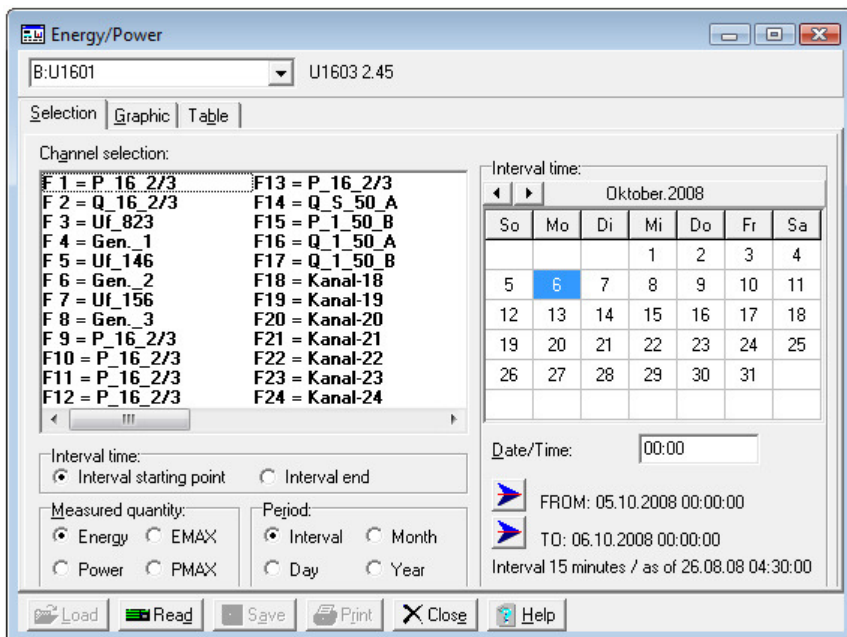


Figure 26

The **Selection** registry card is used to determine which data are to be displayed. For all intense purposes, all of the values stored to the summators can be accessed. Data are available from within the time range which has been selected for data storage to the summators (see ECS documentation from GOSSEN-METRAWATT). Available time ranges include (in addition to current values) 2 years (annual overview), 12 months (monthly overview), 10 days (daily overview) or between 10 and 682 days (in accordance with the number of formatted channels with an interval duration of 15 minutes), if **Interval data** has been selected. The 10 largest values are recorded as maximum values along with time of occurrence. Due to the fact that maximum values (energy or power) are read out along with time of occurrence, only one channel can be queried at a time with the current program version (internal creation of the graphic representation only supports one time channel). A summary of possible queries and their corresponding commands is provided in the following table:

	<i>Within Interval</i>	<i>Per Day</i>	<i>Per Month</i>	<i>Per Year</i>
Energy:	Eint	Eday	Emon	EYear
Mean Power:	Pint	Pday	Pmon	PYear
Max. Energy Values:	EMax (10)	EmDay	EmMon	EmYear
Max. Power Values:	PMax (10)	PmDay	PmMon	PmYear
List length:	variable	10 + current day	12 + current month	2 + current year

Table 11

The following is a description of the data entry fields included in the **Selection** registry card. The **Interval time** selection determines whether the beginning or the end time of the interval is queried from the summator. The **Measured quantity** selection field allows for the selection of **Energy** or **Power** values, as well as the corresponding **Maximum** values. A **Period** can then be established for the selected measured quantity types, i.e. interval, daily, monthly or annual data. The channel names of the current summator are displayed in the list. Formatted channels are identified with a preceding **F** (only formatted channels can be read as interval data), and non-formatted channels are identified with a preceding **K**. The channels whose data are to be displayed must be selected. Selection can be made by clicking on the desired channel with the left mouse key, or with the space bar. However, if the shift key is pressed and held, a range of entries (from .. to) can be selected within the list, and if the Ctrl key is pressed and held, single entries can be added to the current selection at will (e.g. for the selection of non-consecutive entries).

If **Interval data** has been selected, the time range must also be defined (**Starting time** and **Ending time**). A monthly calendar is provided as a tool for entering dates. An entry field underneath the calendar can be used for entering times of day. The buttons below the time entry field are used to designate the currently selected point in time as the **From** time or the **To** time for the read-out of max. 3000 intervals. The oldest interval is displayed underneath the buttons

and serves as a demarcation. This entry is valid for the point in time at which the summator was selected, and is not updated when the next interval limit is exceeded.

The read-in of measurement data is started with the **Read** button. The program generates a query command based upon the previously made selections, transmits the command sequentially to the summator and displays the results at the graphics registry card. Due to the fact that data transmission may take several minutes (depending upon data volume), the query is broken down such that the user receives information in cyclical steps (e.g. 10 steps for interval data) concerning data transmission progress. Upon completion of data transmission, the **Graphic** registry card is opened automatically. The **Table** registry card can only be opened manually, where data from the currently selected portion of the characteristic curve are displayed. Tolerances for data entered to the table can be selected with the **Places after the decimal** selection field.

Available possibilities for individualization of the measurement value graphic are described below in the general information concerning this object. The buttons at the bottom of the window change their functions in accordance with the currently selected registry card. The various button functions are described in the following table:

	<i>Selection</i>	<i>Graphic</i>	<i>Table</i>
Open	Query data at summator		Open existing table
Read			
Save		Write data to WERTE.TMP file	Write table data to a file with a freely selectable name
Print		Print graphic	Print table

Table 12

2.5.5 Instantaneous Value Recorder

This window allows for continuous recording of instantaneous values from an U16xx summator, and displays these data as a characteristic curve. The graphic representation is updated each time a new logical record is received, as would also be the case with a line recorder. Data are stored to a FIFO memory, and old data are overwritten after a period of time.

Three registry cards are provided for the selection and display of measurement values. These include **Selection**, **Graphic** and **Table**.

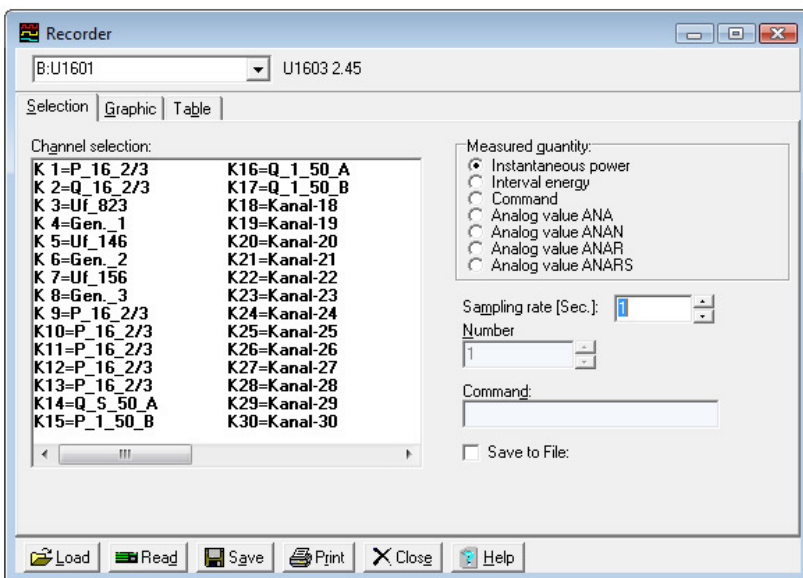


Figure 27

The **Selection** registry card is used to determine which data are to be displayed. All of the channels of a given summator are displayed in a list, and can be selected in the usual manner (use the **Shift** or the **Ctrl** key if necessary). In addition to the channels to be displayed, the time interval used for querying data (**Sampling rate** within a range of 1 to 60 seconds) and the measured quantity (e.g. instantaneous power **PMOM**, interval energy **EINT** or **Command**) can be selected. If the selected summator is capable of processing analog quantities (e.g. U1601 or U1615), the **ANA** values can be queried from any existing analog inputs.

If the user selects **Command**, **ECSwin** executes the **ECL** command sequence displayed in the two data entry fields at the bottom right-hand portion of the window. An **ECL** command sequence must be entered to the **Command** field, which pushes any desired data to the stack at the summator. The entry field above the **Command** field indicates the number of data per sample which **ECSwin** will read from the ECL stack. **ECSwin** automatically pushes the commands required for reading summator time and data to the stack. A simple example:

Number: 3

Command: eint-1,pmom-1,rel-1

This command line allows for the recording of energy consumed during the interval, instantaneous power for a given channel and the status of a given relay. The need for this solution could result from a simple background program (energy optimization) which activates a relay in order to shutdown a specific energy consumer depending upon previously consumed energy, instantaneous power and remaining time until the next interval, if it can be assumed that prescribed interval limit values will be exceeded. Recording of this data could provide valuable information during the creation and testing of such a program.

Due to the fact that FIFO memory capacity is limited, the **Save to file** function can be activated which writes measurement values to data files in a cyclical fashion. The resulting files contain text, and can be processed with, for example, Excel. A fixed procedure is used which cannot be modified. 1000 measuring points are written to each file, after which a new file is created. The files are named as follows: SCHREIB.001, SCHREIB.002 up to a maximum of SCHREIB.999. The files are saved to the **ECSwin** program directory. Existing files with the same name are overwritten without warning. A file name is created each time a recorder window is opened (starting with SCHREIB.001). Each time a file is created, a message to this effect appears at the window's message field (to the right of the summator selection field).

The data recording process is started with the **Read** button, and the **Graphic** registry card is automatically displayed. The graphic representation is updated each time a new logical record is received. Display parameters can be changed as described above. The **Display** column in the display parameters table allows for temporary removal of selected characteristic curves from the display for improved clarity. This has no affect on data transmission, which can be queried from the FIFO memory and displayed at any time.

2.5.6 Working with Graphic Representations of Measurement Values

The graphic representation function provides the user with the ability to display measurement data from a summator in the form of a diagram. Various options are made available which allow the user to modify the outward appearance of the graphic representation. These options affect the selected time range encompassed by the representation, the number of displayed curves and their shapes, color and scaling. Characteristic curves are printed out in accordance with currently selected settings.

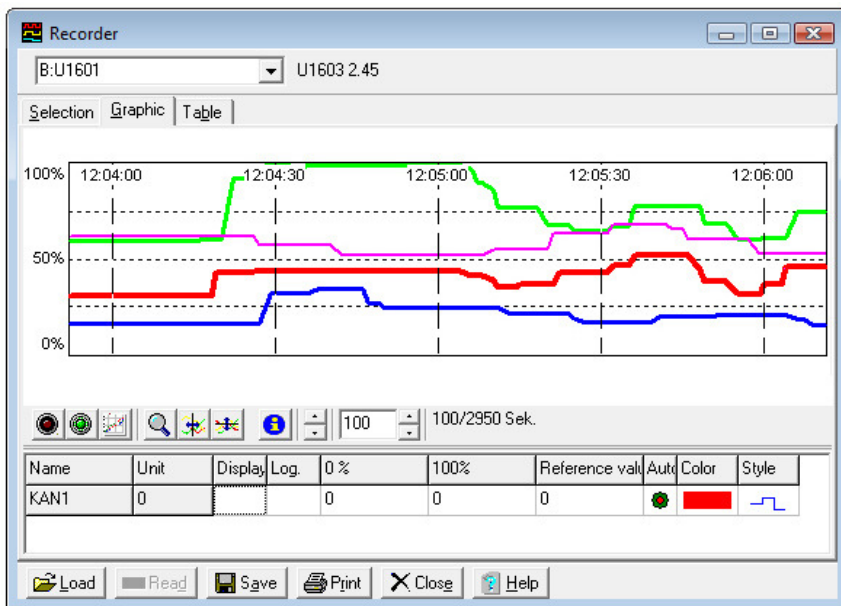


Figure 28

The available area utilized for the graphic representation is divided into three areas. The uppermost area is used for the display of characters, and its size is variable. This means that any surface area gained by enlarging the diagram solely benefits horizontal and vertical resolution of the diagram itself. Further enhancement of the diagram's resolution can be attained by dragging the parameters table out of the visible window with the mouse cursor (drag by grabbing the border between the toolbar and the table).

The individual characteristic curves are scaled and displayed in accordance with the selected values (0% and 100% column in the parameters table). Due to the fact that each characteristic curve can be scaled differently, Y coordinates are shown as percentages. The toolbar at the middle of the window displays a number of buttons whose functions are directly related to the appearance of the characteristic curves, and the time range of the data. The table at the bottom of the window serves as a key for the characteristic curves, and also allows for configuring graphic parameters – the graphic representation is modified as soon as the contents of any of the cells has been changed (e.g. scaling, color or curve type). The change becomes effective as soon as the cursor is moved from the cell with the changed data to any other cell. The **Autoscaling** column initializes the automatic scaling function for the selected characteristic curve. The program finds the smallest and greatest values along the Y axis, rounds these values and then displays the characteristic curve based upon the new

scaling values. As a rule, if display parameters are changed for one of the two objects, the changes become immediately effective for the other object as well. The parameters contained in the table at the bottom of the window have the following significance:

- **Display:** Allows for temporary removal of one of the characteristic curves from the display.
- **0% value:** Lowermost scaling value for the characteristic curve
- **100% value:** Uppermost scaling value for the characteristic curve
- **Reference value:** Displays a horizontal line (in the color and style of the corresponding characteristic curve) at the height of the selected value, if a value other than 0 is entered.
- **Autoscaling:** Automatic scaling for the corresponding characteristic curve
- **Color:** Determines the color of the corresponding characteristic curve.
- **Style:** Allows for the selection of predefined curve types and line thicknesses.

The following curve types are available: line (direct connection of measuring point), stepped line (measuring points are connected with a step-like line), needle (various thicknesses available), pixels (various shapes available).

The parameters table, the diagram window and the data table are linked to a pop-up menu. The functions included in this pop-up menu depend upon which of the three elements is active. The following functions are available for the parameters table: **Copy line** (copy all data from one line to another line within the table), **Fill column** (insert the value from the selected cell to all cells of the selected column) and **Set scaling** (enter the current 0% and 100% values to all lines).

Each measurement value is transmitted along with its time of occurrence. The measuring points are thus positioned along the time axis in accordance with the actual time of measurement (based upon the summator's clock). As long as the measuring series has not yet progressed far enough to encompass all of the displayed points, values are displayed at equidistant intervals. This also applies to graphic representations for which precise pinpointing within time would not make sense (e.g. for maximum values). This condition is indicated by means of dotted lines which are utilized to describe the time frame. The time frame is described with dashed lines for real-time representation, in which case the dashed lines do not necessarily coincide with the interpolation points which occur along the characteristic curve.

The memory to which these data are stored is a FIFO memory. Older data (e.g. instantaneous value recorder) are thus overwritten after a given period of time. However, the period of time for which data are maintained is many times greater than time period which is encompassed by the graphic representation. A toolbar

is included directly underneath the graphic window for individualizing the displayed image. The functions of these buttons are described with brief explanations which can be displayed by positioning the mouse pointer at the desired button. For example, the **Entire curve** button can be used to display all data available from the FIFO memory, and selected areas of the graphic can be enlarged with the help of the **Zoom cursor**. If the vertical or the horizontal cursor is activated, measurement values are displayed numerically at the right-hand side of the diagram as well as graphically. Continuous updating of the graphic is interrupted until the respective button is activated a second time, or until the internal timeout period has elapsed. Data logging continues in the background regardless of the current display status. In addition to this, current graphic data (measured quantity name, unit of measure, color and curve type) can be displayed at a separate window.

By pressing and holding the left mouse key and dragging the cursor over the surface of the graphic, a rectangle can be defined whose dimensions remain fixed after the mouse key is released. This rectangle marks the excerpt from the graphic to be displayed with the zoom function. This function interrupts continuous updating of the graphic representation and reconfigures the limits for vertical scaling and the time frame. The characteristic curves are then redrawn and the changed parameters are entered to the table.

Horizontal and vertical mouse pointers are available. The visible interpolation points along the characteristic curves can be displayed in numeric form with the help of these pointers. After this function has been activated, the surface area allocated to the display of the characteristic curves is reduced. The corresponding measurement value can be displayed numerically by pressing and holding the left mouse key and positioning the pointer at the desired interpolation point. A horizontal cursor can be activated in the same way, which displays the current Y value for each characteristic curve (in relationship to the selected scaling values).

Various fixed values can be selected by scrolling through the entry field next to the cursor mode buttons in order to determine the number of places after the decimal point for numeric displays, and during entry of numeric values to tables and files. Changes made to this entry field become effective as of the next numeric display. The visible range of the recorder can be changed with an additional entry field.

When graphics are printed, the program adapts the representation to the size of the paper and the selected page format (landscape or portrait) in an optimized fashion. As opposed to the key for the graphic representation, a minimum size applies to the print-out of the characteristic curves. The characteristic curves are printed out in accordance with the currently selected parameters, as they appear at the monitor.

2.6 The Window Menu

2.6.1 Window Menu Functions

This menu contains various entries which allow for individualizing the appearance of the user interface. These include the following functions for arranging the windows:

- Cascade
- Arrange icons
- Minimize all
- Close all.

Beyond this, the names of all open client windows are displayed at the bottom of this menu. In this way, each of the open or minimized windows can be returned to the foreground at any time. All open windows can be activated, one after the other, with the help of the key combination Ctrl-F6.

2.6.2 Cascade

This functions display all open windows an overlapping fashion.

2.6.3 Arrange Icons

All of the windows which have been minimized to icons are arranged equidistant from one another, starting at the bottom left-hand edge of the program window.

2.6.4 Minimize All

All open windows can be minimized to icons. Even as icons, minimized windows continue to fulfill all of their normal data logging and command transmitting functions, as required by running programs.

2.6.5 Close All

This function closes all open program windows. If required, the program asks the user if changed data should be saved before closing each window.

2.6.6 Dynamic Menu Items

Each time a new window is open, an additional entry appears in the **Window** menu. These entries disappear when the corresponding windows are closed. If one of these dynamic menu items is activated, data can be entered to the corresponding window.

2.7 The Help Menu

2.7.1 Help Menu Functions

Online help can be queried from this menu. The following help functions are available:

- Index
- Getting started
- Using online help
- About ...

2.7.2 Index

This command displays an overview of the contents of the online help function. Sub-indexes can be opened by clicking on any of the main topics. The online help menu includes all of the usual windows functions for locating topics in a hypertext document.

2.7.3 Getting Started

Explains the purpose of the program and provides a brief overview of its capabilities.

2.7.4 Using Online Help

This command queries instructions for the use of Windows online help.

2.7.5 About ...

This function displays information concerning the version number and the release date of the program. This information is especially important when external support is required for the elimination of problems.

3 Appendix

3.1 Scripting

The **ECSwin** program can be started using the name of a script file as a parameter. If this is the case, functionality of the **ECSwin** program is expanded to include the option described in the **Configure|Command Transfer** menu allowing for the transmission of any desired ECL commands to U16xx summators within the ECS LAN without any user interaction. **ECSwin** can be activated by the user with the name of a valid script file as a parameter in order to start the program. The function included with the operating system for planning program starts (**Control Panel** / Scheduled Tasks or **My Computer** / Scheduled Tasks – depending on the utilized operation system, e.g. Windows 9x, NT, 200x, XP etc.) can be used for automated, cyclical processing of certain tasks.

The included script control file (`script.txt`) contains pseudo commands for loading the transfer files with the ECL commands, for transferring the commands to the ECS LAN and for saving response data to a PC. Possible commands are listed and annotated in table 13, as well as in the sample file. Two TRA files are executed, one after the other, by the sample script control file (`ParaScript.tra` contains sample ECL commands for saving summator parameters; `EintScript.tra` contains sample ECL commands for reading interval data from the previous day). The names and directory paths used to save the data must be selected such that they coincide with the circumstances which prevail within the system. Connection to (any) target host must first be established!

<i>Command</i>	<i>Explanation</i>
//	Comment
path e:\dat\	Readout path including backslash
host target	Name of the target host entry
load eintscript.tra	Load the command file
station A:	Execute the command file with the specified summator
	or
station	Execute the command file with the current summator
save dat\$.xxx	Save the data to a file; the current date (format: YYMMDD) is generated in place of \$.

Table 13

3.2 Data Files Required by the Program

The following data files are required for correct functioning of **ECSwin**:

1. ECSWIN.EXE – program file
2. ECSWINxxx.HLP, ECSWINxxx.CHM – multilingual online-help for the ECSWIN.EXE program which complies with standard Windows help criteria
3. INI\ECSWIN.INI – contains saved configuration and window data and host list entries
4. FELANIP.EXE – program file which allows for data exchange between a summator and the server (serial), and between the client and the server. (over TCP/IP)
5. FELANIPxxx.HLP, FELANIPxxx.CHM – multilingual online help for FELANIP.EXE
6. INI\FELANIP.INI – contains current data transmission parameters for the serial interface.
7. ECSWINR.DLL, FELANR.DLL – resource files
8. REGD.FON – font file for panel windows.

Several demonstration files are included with the installation CD, which provide examples of the various parameter files. These include:

9. DEMO.ALL – parameter file with general summator parameters (General parameters window)
10. DEMO.KAN – parameter file with channel parameters (Channel parameters window)
11. DEMO.PAR – data for complete parameters configuration of a summator (Command transmission window)
12. DEMO.WER – measurement value file (Energy/Power window)
13. DEMO.ZAH – U16xx meter readings (Meter readings window)

3.3 Utilized File Name Extensions

Depending upon the window from which the data originate, **ECSwin** utilizes the following default file name extensions:

<i>Window</i>	<i>Content</i>	<i>Extension</i>
Program	Program performance, positioning of windows	*.INI
Terminal	Command sequences Command sequences in DOS format	*.TXT *.DAT
General Parameters	General summator parameters	*.ALL
Channel Parameters	General U16xx parameters	*.KAN
	Special U1615 parameters	*.ANA
	Special LON parameters	*.LON
	Parameters for all groups	*.CHN
Meter Readings	Meter readings for ETot, ETotT1, ETotT2	*.ZAH
Relay Parameters	U1600 relay parameters	*.REL
Data	Any group of commands	*.TRA
Transmission Optimization	Optimization window parameters	*.OPT
Energy/Power Recorder	Measurement values Recorder data	*.WER SCHREIB.001... SCHREIB.999

Table 14

3.4 Entries to the Program INI File

The name of the INI file is generated automatically based upon the name of the program, to which the extension **.INI** is added. The INI file should be written to the program's \INI directory. This file is generated with default parameters the first time the program is initialized.

```
[PROGRAMM]
HOST=localhost
PORT=1700
LANGUAGE=0
PROTOKOLL=0
POSI=-4;-4;1032;748
```

The first two parameters in the INI file only are required for automatically establishing a connection with a server program after the starting of **ECSwin**. The definition of a host address can also be included in four-place decimal notation (e.g. 194.231.138.230). This entry makes reference to the host address at the PC to which the program FELANIP.EXE or ECSDIENST.EXE (ECSService.EXE) has been installed. Port=1700 is the default setting for the server program as well. If a different port number is to be used, the entry must be changed in both files (i.e. ECSWIN.INI and FELANIP.INI). The user interface language can be selected with the LANGUAGE entry (0: German, 1: English, 2: Italian, 3: Portuguese). PROTOKOLL=1 results in the creation of a log file in the program directory path.

The INI file may contain additional information as well, which makes reference to the various program windows. This usually involves information concerning the position and size of the windows. These entries are continuously updated by the program.



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<http://www.ecswin.de>

Information, Downloads, Online Shop

The screenshot displays the Fischer & Partner KG website, which is a platform for ECWin software. The website is divided into several sections:

- Header:** Includes the company name "Fischer & Partner KG" and navigation links such as "Start", "Über uns", "Leistungen", "Kontakt", and "Downloads".
- ECWin-Software:** A table listing various software products, their descriptions, and prices. The table includes columns for "Produkt", "Beschreibung", "Preis", and "Status".
- ECWin-Software Table:**

Produkt	Beschreibung	Preis	Status
ECWin version 1.0	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.1	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.2	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.3	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.4	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.5	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.6	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.7	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.8	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 1.9	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar
ECWin version 2.0	Software zur Parametrierung und Konfiguration der ECWin-Systeme	100,00 EUR	Verfübar

- ECWin-Software:** A section titled "ECWin-Software" with a list of products and their descriptions. The list includes "ECWin version 1.0", "ECWin version 1.1", "ECWin version 1.2", "ECWin version 1.3", "ECWin version 1.4", "ECWin version 1.5", "ECWin version 1.6", "ECWin version 1.7", "ECWin version 1.8", "ECWin version 1.9", and "ECWin version 2.0".
- ECWin-Software:** A section titled "ECWin-Software" with a list of products and their descriptions. The list includes "ECWin version 1.0", "ECWin version 1.1", "ECWin version 1.2", "ECWin version 1.3", "ECWin version 1.4", "ECWin version 1.5", "ECWin version 1.6", "ECWin version 1.7", "ECWin version 1.8", "ECWin version 1.9", and "ECWin version 2.0".
- ECWin-Software:** A section titled "ECWin-Software" with a list of products and their descriptions. The list includes "ECWin version 1.0", "ECWin version 1.1", "ECWin version 1.2", "ECWin version 1.3", "ECWin version 1.4", "ECWin version 1.5", "ECWin version 1.6", "ECWin version 1.7", "ECWin version 1.8", "ECWin version 1.9", and "ECWin version 2.0".