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Technical Data

Part Number	Handheld:	00.58.022-0101
	Cabinet case	00.58.022-0102
ROM Version	V1.1	
Dimensions	Hand-Held housing: 150*85*45mm	
	Cabinet housing: 144*72*60mm for cutout of 138*68mm	
Schutzart	Handheld device:IP50	
	Cabinet device after installation with enclosed seal: IP54	
Equipment	Processor with RAM/EPROM	
	LC Display, 2*16 characters, background light, high contrast	
	2*64KB flash RAM (non-volatile)	
	RS485 interface, half duplex	
	Actuator with 4 keys	
Voltage Supply	12-30 VDC or 12-24 VAC	
Current Input	12V:100mA 24V:50mA max.	

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Summary

The LCD terminal is an operator panel and indicator unit for all series of KEB frequency inverters. It is available in a Hand-Held housing or a cabinet case. The connection of up to 30 inverters is done serially with KEB-DIN66019 protocol. The power supply is supplied externally (cabinet / inverter / power supply unit).

The data which is permanently stored (firmware image and user image) is verified with a check sum every time the LCD terminal is switched on. If the check is not correct, then further operation is not possible and the respective image must be loaded again.

The LCD terminal works alternatively in different operating modes:

Advanced Mode:

Display/change of all parameters of the inverter connected with the standard parameter names and units.

Customer Mode:

Operation of selected parameters in user-specified defined normalization and/or plaintext display. Monitoring of the parameters for limit values with message output.

Up/Download Mode:

To load/write any stored parameter list in the terminal from/to the connected inverter.

System Config Mode:

Adjust the operating parameters.

Load Firmware:

Load the parameter and download lists with the PC program LCDLOAD.EXE (available as accessory). This program compiles the setting and serially writes them into the terminal.

Accessories

PC Program LCDLOAD + Instruction Manual LCD-Terminal	0S.58.022-0101
Software Combivis	0S.58.038-0002
PC Interface Converter RS232/485	00.58.025-0018
Cable PC/ Interface Converter	00.58.025-000C
RS485 Screw Adapter on D-SUB 9	00.58.025-0209
Plug-In Power supply 12V/500mA	00.90.034-0002

Connections

The connection of the LCD terminal in the Hand-Held housing is done at the end of the prefabricated cable as follows:

Cable 1	yellow	voltage supply
Cable 2	green	voltage supply
Cable 3	white	RS485 A (+)
Cable 4	brown	RS485 B (-)
Cable 5	shield	screening RS485

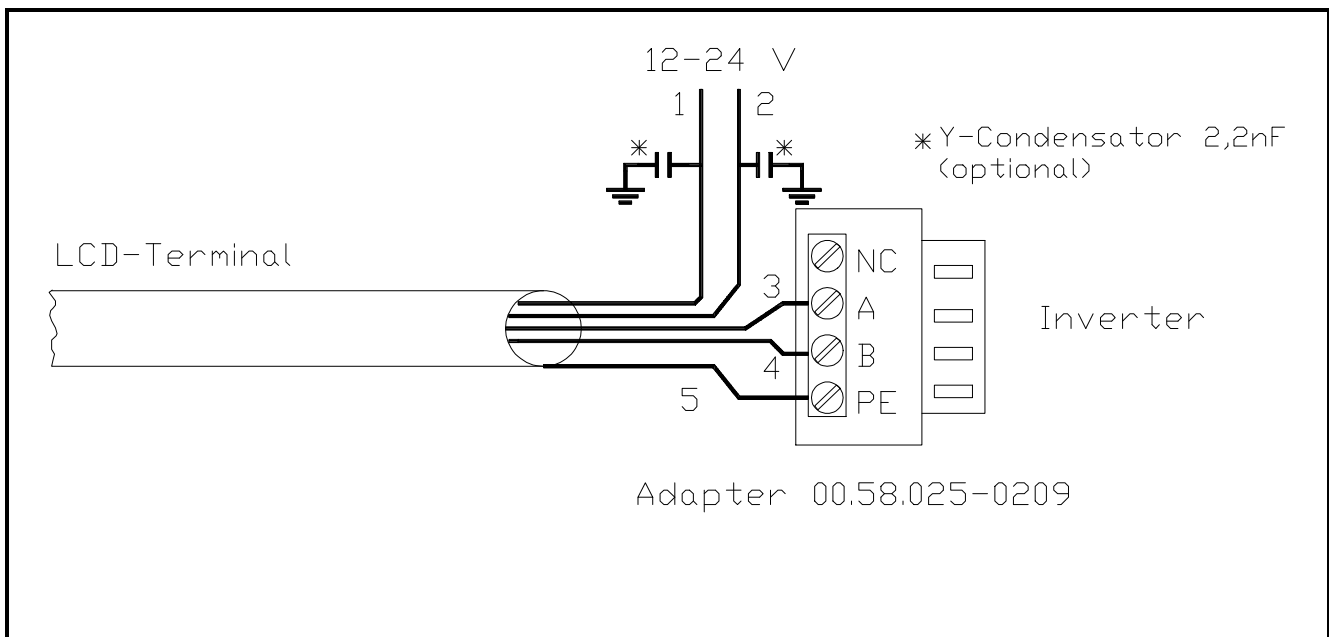
The cabinet variation has an opening in the rear panel and can be reached with a 4 pole connector with the following pin assignments:

Terminal 1	voltage supply
Terminal 2	voltage supply
Terminal 3	RS485 A (+)
Terminal 4	RS485 B (-)

The connection of the voltage supply can be unshielded, the RS485 line must be shielded (connect shield single-sided in the cabinet).

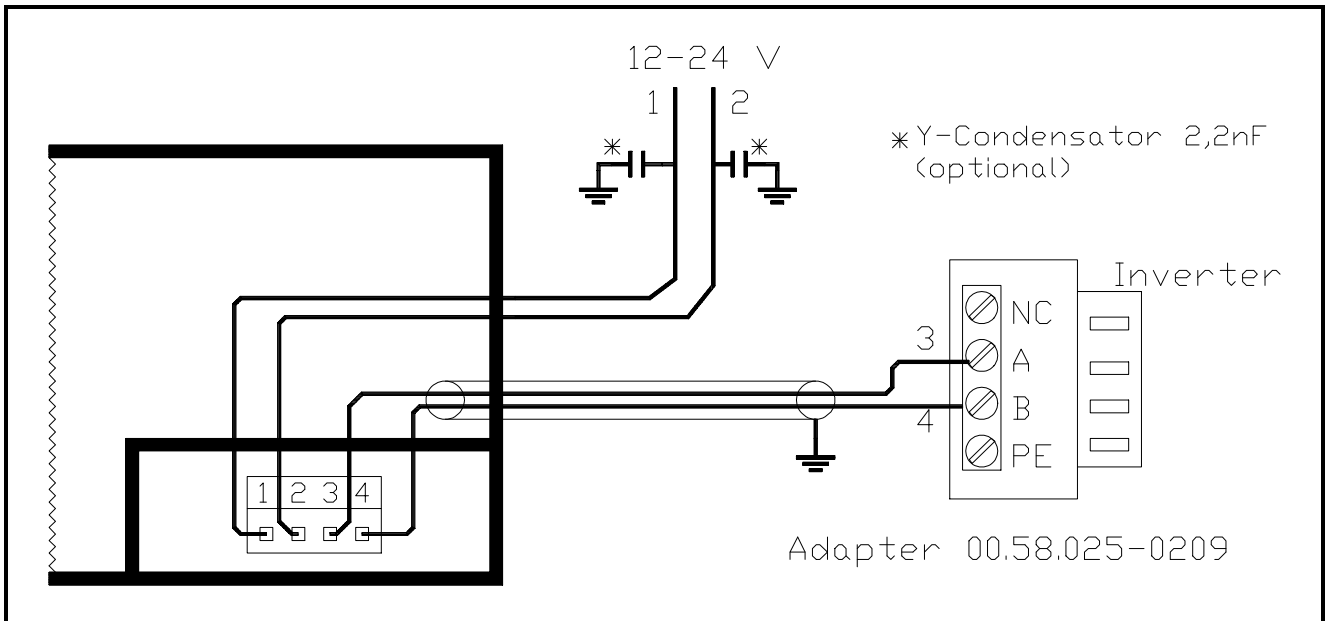
The polarity of the voltage supply is random.

Connection of the Hand-Held unit:



* The capacitors marked in the drawing are only necessary when the voltage supply is interfered hardly (spikes > 1KV).

Connection of the cabinet case::



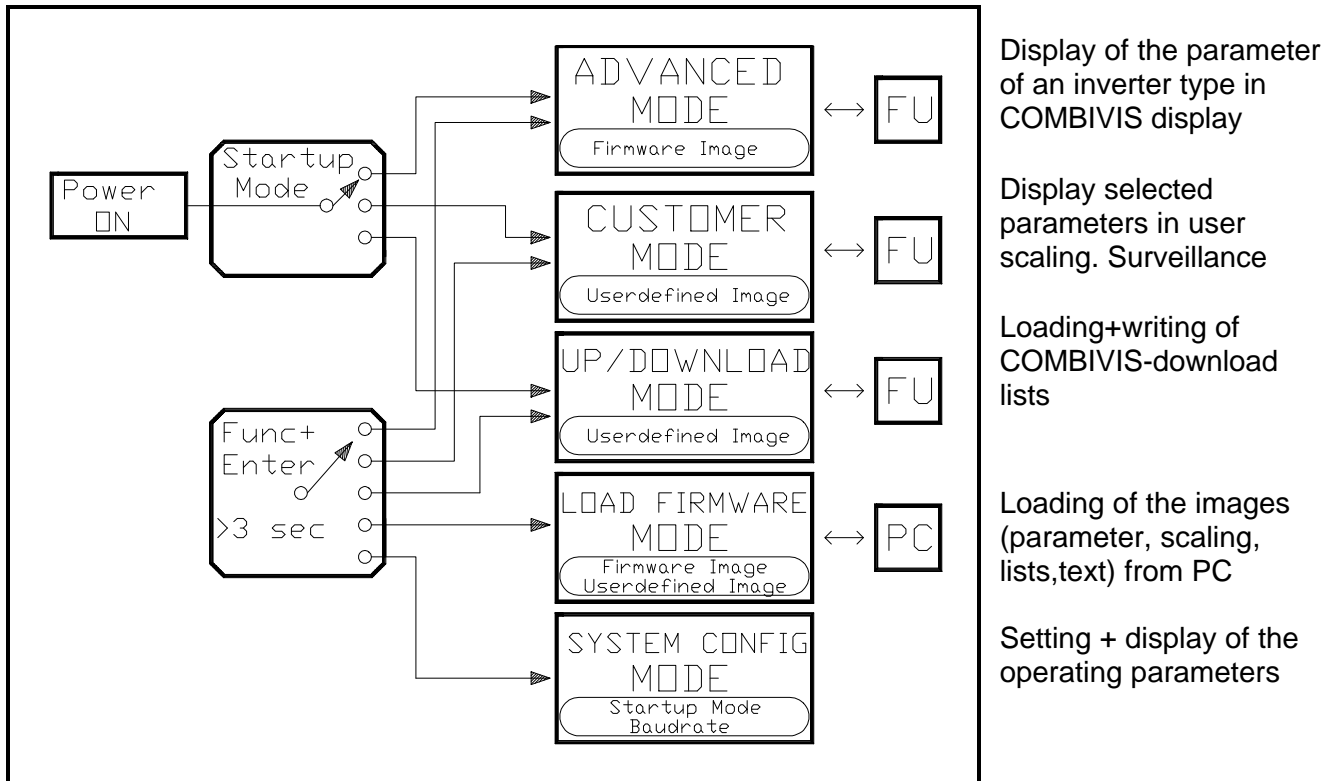
* The capacitors marked in the drawing are only necessary when the voltage supply is interferenced hardly (spikes > 1KV).

ATTENTION: *The voltage supply is not isolated from the RS485 interface. The isolation of the interface takes place in the KEB frequency inverter. When connecting foreign components onto the RS485 bus, make sure that the voltage difference between the negative connection of the operating voltage and the RS485 interface is no larger than 6 volts.*

When connecting several inverters (up to 30 units), lines 3 and 4 are lead to the next inverter with a shielded cable, and as well connected with an adapter. The beginning and the end of the RS485 bus line must each have a resistor of 150 Ohm, connected between lines 3 and 4. Alternatively a simple D-Sub-9 connector may be used for a connection to the inverter. Link the contacts 4 + 8 and then connect to line 3 (485 A(+)), contacts 5 + 9 are connected to line 4 (485 B(-)). All other contacts are not connected.

I - LCD-Terminal

Summary of the Operating Modes



Display of the parameter of an inverter type in COMBIVIS display

Display selected parameters in user scaling. Surveillance

Loading+writing of COMBIVIS-download lists

Loading of the images (parameter, scaling, lists, text) from PC

Setting + display of the operating parameters

Changing the Operating Mode

To change the operating mode, simultaneously press **FUNC** and **ENTER**. After about 3 seconds the display changes to „Select Mode“. Now the desired mode can be changed with the **UP** or **DOWN** keys and be switched on with **ENTER**.

The standard mode after the startup (startup mode) can be selected in the operating mode System Config. If during power-on the **FUNC** key is held down for about 5 seconds, the terminal changes immediately into the Load Firmware mode.

Advanced Mode

In the Advanced Mode the parameters are displayed with their original names and their special scaling. For this the parameter and scaling information must be available for the inverter type selected in the firmware image. The firmware image is compiled with the program LCDLOAD and loaded into the LCD terminal (see Chapter LCDLOAD).

If no information is available for a selected inverter, then „Unknown Type“ or a text defined by the user will be shown instead of the parameter name.

A parameter is shown as follows on the display:

o	p	0	0			l	n	p	u	t		s	o	u	r	c
_	1	_	0			1	:	a	n	a	l	o	g	/	d	i

Line 1 shows the actual parameter with group/number/name.

Line 2 shows the selected inverter (_1), the actual set (_0) and the value of the parameter as plaintext or standardized value with unit. If the actual parameter is not set programmable, then no set is displayed („_“). The display „_A“ for the set means, that the active set is displayed.

The actual parameter is continuously read out and displayed. The next parameter of the actual parameter group can be displayed with the **UP** key, the previous parameter with **DOWN**. With the **ENTER** key, the first parameter of the next group can be immediately selected. To change the parameter value, set, group or inverter number press the **FUNC** key until the blinking cursor appears at the position desired:

Cursor on the parameter value (line 2 column 16):

(If this cursor position cannot be reached, then the actual parameter is write-protected ⇒ read only!). The parameter value can be changed with the **UP** or **DOWN** keys. When the keys are pressed down for a longer period of time, the value changes more quickly. If the parameter value is shown in plaintext, the display changes over to the next/previous plaintext. If the desired value is not available as plaintext, then you can simultaneously press the **UP** and **DOWN** keys until it switches over to numerical input. With **ENTER** the new value is sent to the inverter. Transmission errors or negative acknowledgments from the inverter are shown for about 3 seconds. Thereafter the actual parameter value is read out again.

Cursor on parameter group (line 1 column 1):

The parameter group can be changed with the **UP** or **DOWN** key. The first parameter in the new group is shown. The new group is accepted with **ENTER**.

Cursor on set (line 2 column 4):

The actual set can be changed with the **UP** or **DOWN** keys. With **ENTER** the new set is written to the inverter, that means the parameter for set selecting is changed to the desired set.

Cursor on inverter number (line 2 column 1):

The inverter address can be changed with the **UP** or **DOWN** key between 0 and 31. With **ENTER** the new inverter is accepted and the type is determined. Then the internal parameter and scaling tables are set up. This can take a few seconds, depending on the scope of the Firmware Image.

Customer Mode

In the Customer Mode the parameters are displayed with 16 characters of text (can be selected by the user) and user-defined scaling entries. For every parameter you can specify the upper/lower limits as well as increments for the input. All necessary information such as inverter number, set, parameter address and scaling/plain text are filed in the Userdefined Image. The Userdefined Image is compiled by the LCDLOAD program and loaded into the LCD terminal (see chapter on LCDLOAD).

A parameter is displayed as follows:

L	i	n	e		S	p	e	e	d		A				
	5	.	0	1	1		R	P	M						

Line 1 shows the actual parameter description.

Line 2 shows the value of the parameter as plaintext or scaled value with unit.

Inverter address and set are not shown but this can be taken from the parameter description.

The actual parameter is continuously read and displayed from the respective inverter. The next parameter can be displayed with the **UP** key, the previous parameter with the **DOWN** key. When changing the current parameter the respective set is automatically given, so that the set-related display is always correct. Press the **FUNC** key once to change the parameter value. The blinking cursor appears on the parameter value. The input occurs exactly like in the Advanced Mode .

Furthermore, some selected parameters may be monitored in the Customer Mode. These parameters are read out in the background one after another, their values are checked and if necessary, a 2 line blinking message is displayed. The user must acknowledge this message by pressing any key.

Up/Download Mode

The Up/Download mode is for reading or writing parameter lists from/to the LCD terminal. The lists are non-volatile stored and can be sent to the inverter again at any time. They can also be read out with the program LCDLOAD and stored as a Download list for COMBIVIS. For every parameter list a 16 character long description as well as the address of the inverter, to which the list should be sent, is filed. The desired list can be selected with **UP** or **DOWN**. The **FUNC** key is used to switch between list selection, Upload or Download. The **ENTER** key carries out the function after acknowledging oncemore with the **FUNC** key. If errors occur during the transmission, they are displayed and the transmission is stopped at this point. If the transmission was successful, then the respective message is shown. Every message must be acknowledged by pressing any key.

Load Firmware

In the Load Firmware mode the LCD-Terminal is ready to receive the firmware and user image via the PC program LCDLOAD. In the display, information about the current activities is shown. Further operation is not possible here while all functions are controlled by the PC. **If the *FUNC* key is held for about 5 seconds at startup, then the terminal changes immediately to Load Firmware Mode.**

System Config

In this mode the baudrate for communication with the inverters and the mode after startup of the LCD Terminal can be specified. Some settings in the LCD terminal can also be called up. With the ***FUNC*** key the functions are selected:

Select Baudrate

With the ***UP*** and ***DOWN*** keys the baudrate is changed between 9600, 19200 and 38400 baud. The baudrate is active after leaving the System Config mode. All connected inverters must use these baudrate!

Startup Mode

With the ***UP*** and ***DOWN*** keys the mode, which is directly active after the terminal is switched on, is specified. These settings must be stored in order to be effective!

ENTER to save config

By pressing the ***ENTER*** key the actual settings are non-volatile stored. Thereafter the System Config Mode is left and the previous mode is resumed.

ENTER to quit (no saving)

By pressing the ***ENTER*** key the System Config Mode is left and the previous mode is resumed. The changes are not stored but a changed baudrate remains until the unit is switched off.

ROM Version

The Eprom version number is displayed.

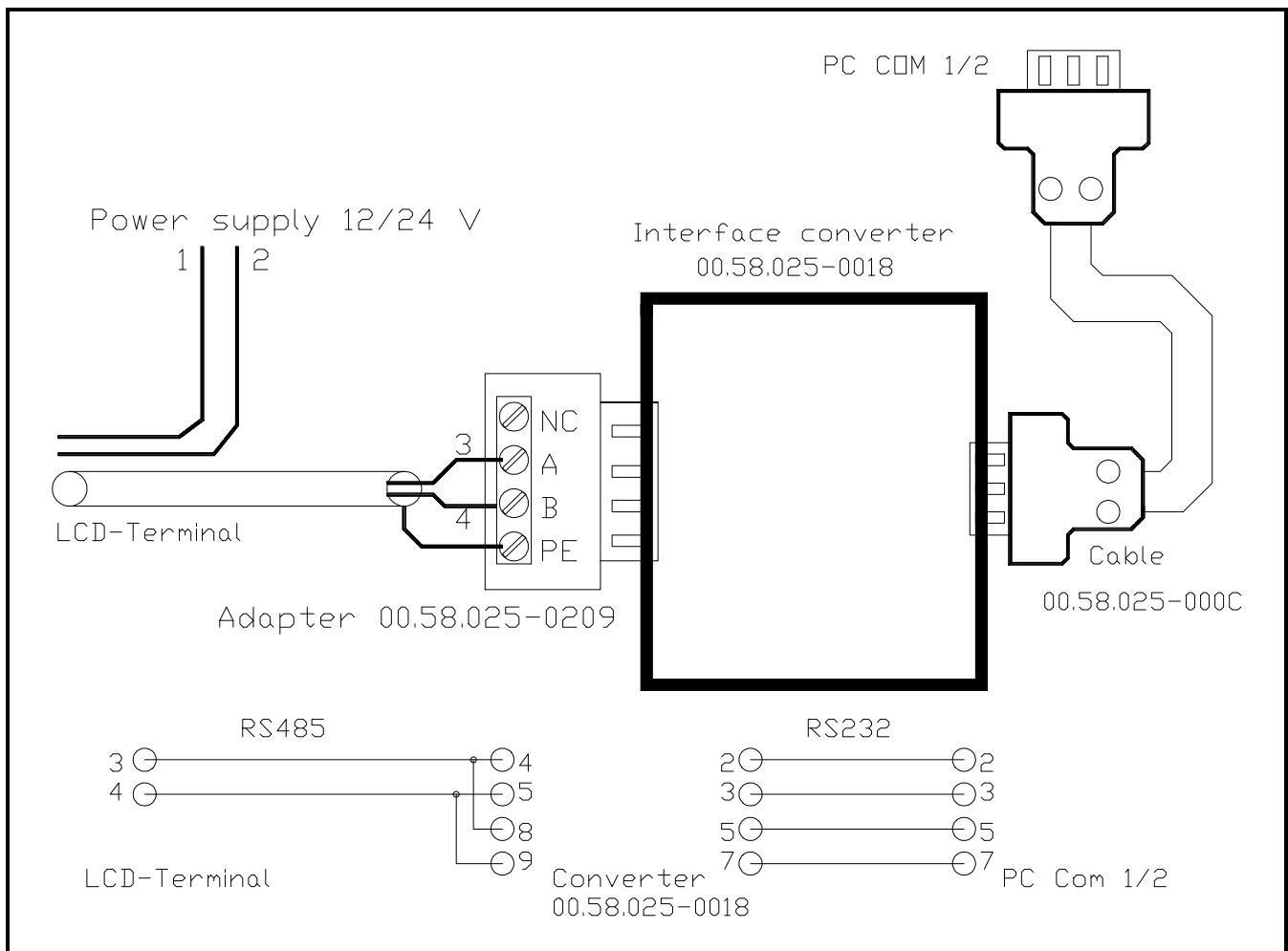
Loaded Types

All inverter types contained in the Firmware Image are displayed one after the other by pressing the ***UP*** key.

II - PC-Program LCDLOAD

The program LCDLOAD.EXE is a DOS based configuration program for the LCD terminal. The Firmware and the User defined Image are created and serially loaded into the LCD terminal. The LCD terminal is connected with an RS232/485 converter (special accessories!) onto the interface COM1 or COM2 and supplied with voltage by a power pack or the like. It may occur that the program does not run correctly in a DOS-Box under Windows, since a higher transmission rate is used for communication. **Start the program in DOS without Windows then.** When using a Windows editor to adapt the user-defined text there may be faulty displays in the LCD terminal with special characters, since Windows does not use the IBM-ASCII fonts. **Use a DOS editor!**

Connection of the LCD terminal to the PC:



To load the Data, the LCD terminal must be in the Load Firmware mode. In this mode the terminal behaves like a DIN66019 slave with the address 239.

The following settings can be changed in the main window by clicking with the mouse or by positioning the cursor on the line and pressing the Enter key:

Parameter Source File

The source file for the Firmware Image is selected. The filename extension for this type is always „.BIN“. This is a Combivis inverter file (e.g. English.bin). All parameter names/scaling for the Advanced Mode are used from this.

Firmware Image File

This is the name of the Firmware Image target file. The filename extension for this type is always „.IMG“. This file can contain up to 65408 Bytes. Files which were compiled once, can later be loaded again and again into the LCD terminal. If no name is specified, then the base name of the parameter source file with the extension „.IMG“ is used during the compiling of the Firmware Image file. If a file already exists with this name, it will be overwritten without a warning.

User Source File

Here a source file can be selected for the user defined image. The filename extension for this type is always „.USR“. In this file all parameters, scaling and plain text are filed for the Customer Mode . Furthermore, the names of the download lists for the Up/Download Mode, all exchangeable operator text for the LCD terminal and the entries for the parameter surveillance are included. The format of all entries can be seen in the file SAMPLE.USR, which is available on the LCDLOAD program disk.

User Image file

This is the name of the User defined Image target file. The filename extension for this type is always „.IMU“. This file can contain up to 65408 bytes. Files which were compiled once can be later loaded again and again into the LCD terminal. If no name is specified, then the base name of the user source file with the extension „.IMU“ is used during the compiling. If there is a file with this name already, it will be overwritten without a warning.

Serial Interface

You can use either COM1 or COM2 as the interface for the communication with the LCD terminal. Other parameters such as baudrate, parity etc., are automatically adjusted by the program.

Language

You can switch between German and English with the ENTER key or the mouse in the LCDLOAD program.

You can activate the following functions using the menu:

Create Firmware Image File

A window appears with all inverter types available in the parameter source file. One or several types can be marked with the mouse or the Enter key. The less types that are marked, the smaller the target file is, the quicker the Firmware Image can be accessed. By pressing the ESC key or the right mouse key, the window closes and the compiling starts. If the maximum size of the Firmware Image is exceeded, then a message is displayed and the compiling is aborted. All processes are recorded in a LOG file. The Log file has the base name of the Firmware Image File with the extension „.LOG“.

Write Firmware Image File to LCD Terminal

The Firmware Image file is transmitted into the LCD terminal. A message shows whether the transmission was successful or not.

Create User Image File

The source file for the User defined image is compiled. All processes are recorded in a LOG file. The Log file has the base name of the user image file with the extension „.LOG“. Errors that are recognized are shown and entered into the Log file. If the maximum size of the User Image is exceeded, then a message is displayed and the compiling is aborted.

Write User Image File to LCD-Terminal

The User Image file is transferred to the LCD terminal. A message shows whether the transmission was successful or not.

Read Download File from LCD-Terminal

Using this menu point the download lists can be read out from the LCD terminal again and stored as PC files. For this, a list with all available download lists of the terminal appears and one can be selected. Thereafter, a filename with the extension „.DWN“ can be used as the target. This list can be processed by Combivis.

Quit

The program LCDLOAD is ended.

Examples

1. Two F0 inverters and 3 F4 inverters should be operated on the LCD terminal. Access to all parameters should occur in COMBIVIS representation. A download list should be filed for each of the inverters, to permanently store all parameter settings.

SOLUTION: First create the download lists with COMBIVIS. Identical lists only need to be created once. Enter the path and the names of the lists for each of the 5 inverters each with another inverter address (e.g. 1...5) in the user defined file (e.g. Sample.USR) in the paragraph %DOWNLOAD%. Later the 5 connected inverters must be adjusted onto the respective addresses. Start the program LCDLOAD and select the menu point „Create firmware image file“. Mark the correct type for the F0 and F4 units (e.g. type 21 and 35) and close the window with the ESC key. The image file is created with all parameter information for these inverter types. Adjust the entry ‘user source file’ onto the file you created/changed (e.g. Sample.USR) and execute the menu point ‘Create user image file’. The image file will be build. Bring the LCD terminal into the Load firmware mode and load the 1st image file with the menu point ‘write firmware image file to LCD terminal’ and the 2nd file with ‘write user image file to LCD terminal’. Now the LCD-terminal can be operated in the advanced mode or in the Up/Download mode.

2. Five parameters for each of 2 connected S4 servo controllers should be displayed and changed in userdefined scaling.

SOLUTION: Edit the user source file (e.g. Sample.USR) and enter 5 parameters for inverter address 1 and 5 for address 2 as %PARA%-entries. A list with all parameter addresses and scalings for an inverter type can be created with the COMBIVIS Printer Utility Program. The desired scaling will be entered with a %SCALE or as plaintext with %PLAN% in the respective %ENTRY% paragraph. Compile the changed file with the LCDLOAD program. Bring the LCD terminal into the Load firmware mode and load the image file with the menu point ‘write user image file to LCD terminal’ into the LCD terminal. In the system configuration mode of the terminal, set up the startup mode to ‘CUSTOMER’, so that the LCD terminal immediately shows the user defined parameter when it is switched on.

3. The LCD Terminal should monitor 10 inverters and give out an error message when the utilization is too large.

SOLUTION: Process the user source file (e.g. Sample.USR) and enter 10 surveillance entries with 10 different inverter addresses as %TRACK% entries. Also insert an %ENTRY% parameter entry as default parameter for read out. Later the 10 connected inverters must be adjusted onto the respective addresses. Compile the file changed with the LCDLOAD program. Bring the LCD terminal into the Load firmware mode and load the image file with the menu point 'Write user image file to LCD terminal' into the LCD terminal. Set the startup mode, which is in the system configuration mode of the terminal, to 'CUSTOMER', so that the LCD terminal always shows the user defined parameter immediately at startup and reads out the monitored parameters in the background.

4. Example entry of user defined standardization

The parameter to be shown has the address 0533h (hexadecimal) and returns the set frequency. The value read is 1/80 of the frequency (Bus value 1=0.0125 Hz).

A frequency of 50Hz in the system means a value of '5 Bags/sec'

The set for this parameter will not be adjusted (always set 0).

The user may enter a bus value between 0 and 5000 in steps of 200.

Entry in the user source file (e.g. Sample.USR):

```
%ENTRY%
```

```
%PARAM,Throughput, 0533h, 1, 0,-1, RW, F2, 0, 5000, 200
```

```
%SCALE%, 1, 800, Bags/sec
```

```
%ENDENTRY%
```

5. Example Entry for Surveillance

The parameter 0406h of inverter 7 should be monitored. A value read of 1000 means 100% utilization (Bus value 1=0.1%). With a utilization larger than 122% an alarm message should be displayed.

Entry in the user source file (e.g. Sample.USR):

```
%TRACK%,7,0406h,FFFFh,1221,32767," Inverter 7:","Overload"
```

Further examples can be seen in the file 'Sample.USR'.