HIQUEL®
HIGH QUALITY ELECTRONICS

HIQUEL-TERM4

The universal alphanumeric text display

CE

BESTELL NR: TERM4-MAN-D-10

HIQUEL-TERM4: User's manual

Order number: TERM4-MAN-D-10

Version: 1.00

Content

Preface

Thank you for purchasing our text display **HIQUEL-TERM4**. Please read all instructions carefully before operation, to ensure your complete understanding and to obtain the best possible performance from the terminal.

Guide

The User's manual is devided into four parts:

The chapter **Product Description** deals with basic informations about the **HIQUEL-TERM4**.

The chapter **Settings** describes the operation of the setup menu and the adjustment of various parameters.

The chapter **Operations** refers to the handling of the terminal.

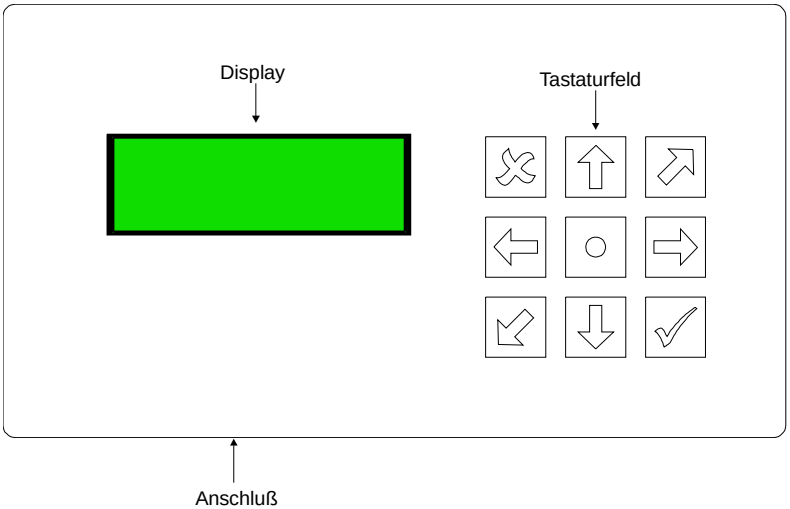
The chapter **ASCII-Mode** defines settings for connecting separate devices with our terminal **HIQUEL-TERM4**.

Product Description

HIQUEL-TERM4 is designed to operate and monitor control systems. e.g.: SIMATIC S5, or SIMATIC S7 etc.

The compact, robust housing features a 4 line LC display, each line having 20 characters. A keypad with 9 overlay keys is also featured. Each key has a unique symbol. Typical applications for this terminal are alarm monitoring, parameter display and edit menu structures and message display. Refer to the chapter **ASCII-Mode** to discover how **HIQUEL-TERM4** is also able to communicate with data on your host system.

HIQUEL-TERM4



HIQUEL-TERM4 is a very compact device. On the front you will find the alphanumeric display and the keypad. On the rear you will find a 6-pole modular socket for connecting the **HIQUEL-TERM4** with the host system.

Display	The alphanumeric display contains a backlit LC-display with 4 lines and 20 characters each line. The character's height is 5mm.
Keypad	The text display is operated by using the softkeys, which use special symbols to make the operation easier.
Connnection	The terminal is supplied with 24VDC via the 6-pole modular socket. The socket also connects the host system via RS232 interface with the terminal.
Size	The terminal is 125mm wide, 108mm high and 22mm deep. The device is designed for front panel mounting but can also be used as a stand-alone-device.

Settings

You can adjust various functions of the **HIQUEL-TERM4** with the setup menu.

SETUP of HIQUEL-TERM4

To get into the SETUP menu, switch off the device first. Afterwards press the keys ⬅, ⬆ and ➡ SIMULTANEOUSLY. Now switch on the device again. After this you will see the following menu for about 5 sec.:

```
Contrast:      50%
Busnumber:      0
Baudrate: 19200 8N1
CommMode:    ASCII
```

The setting which is active and ready to be changed is flashing. To choose another setting to adjust, use the buttons: ⬆ and ⬇. To adjust a setting use the keys: ⬅ and ➡. For saving all changed settings press ✓. Setup will be closed. To exit without saving press ✗.

Contrast

The first setting is the LC-display contrast. Adjust the display with ⬅ and ➡. The higher the contrast, the darker the display will appear.

Busnumber If you want to connect more than one terminal with the bus of **Hiquel-Term4** during the protected mode, you can adjust bus numbers for the individual terminals with ← and → between 0 and 255.

Baudrate Here you can adjust the serial communication format and speed. Use ← and →. You can choose the following settings:

Setting	Baudrate	Data Bits	Parity	Stop Bits
4800 8N1	4800Bd	8	Non	1
4800 8E1	4800Bd	8	Straight	1
4800 8O1	4800Bd	8	Not straight	1
9600 8N1	9600Bd	8	Non	1
9600 8E1	9600Bd	8	Straight	1
9600 8O1	9600Bd	8	Not straight	1
19200 8N1	19200Bd	8	Non	1
19200 8E1	19200Bd	8	Straight	1
19200 8O1	19200Bd	8	Not straight	1

Comm mode With the keys ← and → you can choose different logs of the **Hiquel-Term4**. The setting ASCII indicates the unprotected ASCII-log. The setting Protected indicates the protected, bus – ready mode of the **Hiquel-Term4**.

Reset the unit

If the device locks up, you can reset it by disconnecting the supply voltage of **HIQUEL-TERM4** first and pressing ↓, ● and → and then re-connecting the supply with the buttons pressed. The usual welcome message will appear after a short period of time. Now you can release the keys. All previously adjusted settings are overwritten and reset.

Operations

This chapter defines the operation of the several components, if you use the **HIQUEL-TERM4** together with the compact control unit RESI-M. This chapter could also be considered as a Design Guide, other host systems like SPS (PLC's) or PC's should follow this example.

Operation elements

- Messages
- Input fields
- Menu

Keyboard

 This key confirms an input positiv. Every number input, menu choice or dialog is confirmed positiv and saved by pressing this key.

 This key aborts a running input of numbers, a menu choice or a dialog adjustment.

 With these keys you can change numbers or change your menu choice.

 Jump into the next input field by pressing this key.

Messages

Messages are static text displays, which inform about a failure or show a result. Example:

```
MESSAGE


This is current status
information
```

If you want to confirm the message and continue with the program, press ✓. With some messages, it's possible to abort a running action and to get one step back. For this use ✗. Example:

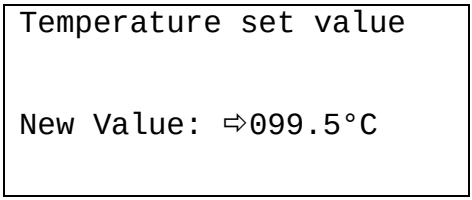
```
START MEASUREMENT


Would you like
measurement to start?
```

Input fields

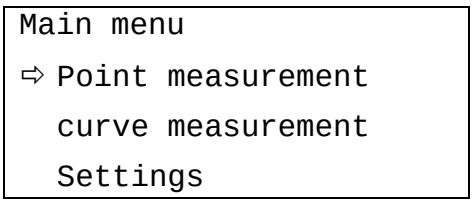
To acquire numbers, **HIQUEL-TERM4** uses a very simple type-in-method. In front of the changeable number you will see a thick, flashing right-hand arrow. Now you can adjust the number with the up ↑ and down ↓ keys. Save the number by pressing ✓ or abort with ✗ in order to restore the previous value. To get to the next input field (if it's existing) press ●.

Example:



Menu

The menu offers you the possibility to choose different settings, to adjust them or execute several functions. Every menu has the same structure:



A thick, flashing right-hand arrow appears. This arrow marks the active setting in the menu. By pressing the up ⬆ and down ⬇ keys you can choose another setting in the menu.

If more menu-entries than lines exist, the text will scroll so that the remaining lines can be viewed.

Having made your choice, you can confirm by pressing  . If you want to abort, press  .

If there are several menu settings, you can choose your setting by using  .

Example:

```
PRINTER CONFIGURATION
Printer  ⇨     ON
Type           BOLD
Language       English
```

ASCII-Mode

During the ASCII-mode the terminal accepts all ASCII-characters that are transmitted over the serial port. The terminal will show them immediately on the display. With special escape sequences you can operate complex functions like cursor positioning or delete screen. You can execute special functions with the following characters.

Sending text

The terminal receives the usual ASCII-characters during the ACII-mode. The chapter CHARACTERS deals with all available characters on the display.

Interpreting special symbols

0x0d	Carriage Return
0x0a	Line Feed
0x08	Backspace
@@	brings out an @

Escape sequences

For special functions like cursor positioning or clear screen, you have to send an escape sequence first. The terminal interprets this function not as characters to display but as parameters for the respective function.

The escape character is always ´@´.

Print Hex as ASCII

As protocols of several host systems do not tolerate the transfer of ASCII codes under 32 or over 127 using a serial port, an

escape sequence was developed that creates the opportunity to display all ASCII characters which are outside this range.

```
@x[HH]
```

This escape sequence creates every character on the display. The code [HH] indicates that the created character is hexidecimal. You can use the numbers ´0´-´9´ and the capital letters ´A´-´F´.

Get Information

With this command you can check the active software version of **HIQUEL-TERM4**. To get the information,

transfer to **HIQUEL-TERM4**:

```
@I
```

You will receive the following response from **HIQUEL-TERM4**:

```
@i[Information]
```

[Information] zero determinated ASCII string, which supplies the information from the terminal.

Position XY

You can put the cursor on any position on the display that you like with this command. You just have to transfer the following code:

To **HIQUEL-TERM4**:

`@P[X][Y]`

[X] indicates the X-position on the display, ASCII-'A' (65, 0x41) stands for the first column, ASCII-'B' (66, 0x42) for the second, etc. The largest used character is ASCII-'T' (85,0x55)

[Y] indicates the Y-position on the display, ASCII-'A' (65, 0x41) stands for the first column, ASCII-'B' (66, 0x42) for the second etc. The largest used character is ASCII-'T' (85,0x55)

The terminal does not respond to these commands.

Delete Screen

This command clears the active display and sets the cursor at the left-hand upper corner of the display.

To **HIQUEL-TERM4**:

`@D`

The terminal does not respond to this command.

Home Cursor

This command sets the cursor at position 1,1. The entire display remains maintained.

To **HIQUEL-TERM4**:

`@H`

The terminal does not respond to this command.

Evaluate Keystrokes

While using the ASCII-Mode, the user can choose between two methods of evaluating keystrokes:

- ❑ Signal edge triggering
- ❑ Condition triggering

These modes can be changes to elapse time, that way the utmost flexibility in the user interface is possible.

You can activate the signal edge evaluation with the following command:

To **HIQUEL-TERM4**:

`@E1`

Response: non

Using signal edge triggering, the **HIQUEL** terminal transfers one character when pressing the key and a second when releasing the key. That way both edges can be used.

You can activate the normal keystroke triggering with the following command:

To **HIQUEL-TERM4**:

`@E0`

Response: non

The terminal will only transfer a character when pressing the key. As all keys have an autorepeat function, in this mode the character will be repeated as long as the user presses the corresponding key.

Key codes

The nine keys are grouped in a 3x3 matrix. The **HIQUEL-TERM4** transfers signals after every pressed key. Using the normal keystroke triggering mode the following codes are transmitted:

 A	 B	 C
 D	 E	 F
 G	 H	 I

Using the signal edge triggering mode the following codes are transmitted:

 A	 B	 C
 D	 E	 F
 G	 H	 I

Releasing the keys, following codes are transmitted:

 a	 b	 c
 d	 e	 f
 g	 h	 i

Define Minimum

With the following characters you can define the minimum for the input. This minimum is used as the bottom limit for all following inputs.

To **HIQUEL-TERM4**:

`@<[MIN]`

The terminal does not respond to this command.

Define Maximum

With the following characters you can define the maximum for the input. This maximum is used as the uppermost limit for all following inputs.

To **HIQUEL-TERM4**:

`@>[MAX]`

The terminal does not respond to this command.

Input Number

You can define the number format with the following characters:

To **HIQUEL-TERM4**:

`@N[L][K][DEF]`

The terminal does not respond to this command.

The transfer parameters have the following meaning:

[L]	indicates the length of the input (max 20 characters) The number has to be transfered as a capital letter between 'A' and 'T'.
[K]	indicates the amount of decimal places. The number has to be transfered as a capital letter between 'A' and 'T'. Letter 'A' indicates no decimal place, letter 'B' indicates one decimal place, and so on.
[DEF]	indicates the default value (initial value) of the input (32 Bit). The number has to be transmitted as a 8-digit hexidecimal number. Only the characters '0'-'9' and 'A'-'F' can be used.

The input will be started at the right-hand side of the active cursor position. After the input the cursor is located behind the input field. That means [L]+1 character to the right of its initial position.

Example:

`@NEB000001FE`

indicates: length 5, 2 decimal places and default value 510.

After this command, the cursor will be set behind the last character.

To change the number value, use the up and down keys.

Response:

If the input is confirmed by pressing , the following protocol will be transmitted:

`@n[VAL]`

[VAL]	indicates the active number value as a 8-digit hexidecimal number . A range from -2^{31} (8000000 sedez.) to $+2^{31}$ (7FFFFFFF) can be displayed.

If you end your input by pressing , the following protocol will be transmitted: @b

Abort Input

You can abort your input with the following characters:

To **HIQUEL-TERM4**:

@n

The terminal does not respond to this command.

Redraw

Response:

@r

These characters of **HIQUEL-TERM4** signal a failure of the display or a failure during the transfer. A new input is required.

Define Character

To **HIQUEL-TERM4**:

`@C[CHAR][BITMAP]`

[CHAR] indicates the ASCII-Code of the new character. You can use numbers from 0 to 7.

[BITMAP] 8-digit hexidecimal numbers will be transmitted, each number defines one segment of a character.

Example:

`@C00001010202120C04`

To define the character press ✓.

HIQUEL-TERM4 responds with the following protocol:

@c

If defining the character was successful it will be saved after switch off.

Beep

With this command you will activate the integrated audible Beep (only available with version **HIQUEL-TERM4B**).

To **HIQUEL-TERM4B**:

`@B[DURATION]`

[DURATION] Duration of the peep indicated in units of 3/100s.

The terminal does not respond to this command.

Protected Mode

The protected mode is a communication form containing identification of transfer failures. By using defined data packages and control sums this mode guarantees the correct display content.

Due to failures, errors can be detected and the appropriate correction can be made. This protocol is protected against failures due to mechanical components and electric current. The following frames are used for the transmission:

Type	Bytes	Description
HEADER	2	Identification for strarting a frame (characters ´T´ ´D´)
STATIONS ID (SID)	1	Address of the receiver (0 to 255) ; Receiver = Terminal
TYPE	1	Function type
DATALENGTH (LEN)	1	Length of the data block indicated in bytes (max 21 bytes); terminal operates line by line
HCRC	1	Check sum for Header
DATA	xx	xx is DATALENGTH . xx bytes will follow
DCRC	1	Check sum for data

The Header activates a new log frame. It's fixed and consists of the characters ´T´ and ´D´. The bus address STATION ID describes the active station (the active terminal). You can adjust the STATION ID in the setup (menu – busnumber). You have to place a number between 0 and 255 for every component. DATALENGTH describes the length of the data block in bytes (max 21 bytes). If the value 0 appears as DATALENGTH, DATA and the check sum will be ignored.

The check sum HCRC calculates:

HCRC = STATION ID **XOR** TYPE **XOR** DATALENGTH

Check sum CRC2 calculates as follows:

DCRC = D_0 **XOR** D_0 **XOR** D_0 ..... **XOR** $D_{datalength\ -1}$

D_x describes the x-byte of the data block.

TYPE=0x01 Clear Screen

With this protocol you are able to delete the entire content of the display.

Transfered protocol to the terminal:

```
´TD´ SID 0x01 0x00 HCRC
```

If the transmission is successful, the terminal will response with the ACKNOWLEDGE protocol:

```
´TD´ SID 0x00 0x00 HCRC
```

TYPE=0x10 Write Line

This protocol writes the transmitted characters into the first line of the display.

Transfered protocol to the terminal:

```
´TD´ SID 0x10 LEN HCRC POSITION DATA DCRC
```

The display will show the characters which are indicated in DATA, to the position POSITION. POSITION specifies a fixed position on the display. The value POSITION is calculated as follows: POSITION=Y-position*20+X-position; X-position and Y-position start with 0 (max 20 characters).

If the transmission is successful, the terminal will respond with the ACKNOWLEDGE protocol:

```
´TD´ SID 0x00 0x00 HCRC
```

TYPE=0x20 Beep

This protocol delivers a audible signal of **HIQUEL** terminal (only availabe with version **HIQUEL-TERM4B**).

Transfered protocol to the **HIQUEL** terminal:

```
´TD´ SID 0x20 0x01 HCRC DURATION  DCRC
```

The parameter DURATION defines the duration of the peep indicated in units ot 3/10 s.

The ACKNOWLEDGE protocol will be the response:

```
´TD´ SID 0x00 0x00 HCRC
```

TYPE=0x80 Check Keys

This protocol checks the keyboard inputs of the **HIQUEL** terminal.

Transfered protocol to the **HIQUEL** terminal:

´TD´ SID 0x80 0x00 HCRC

The ACKNOWLEDGE protocol will be the response:

´TD´ SID 0x81 0x02 HCRC STATUS DCRC

The returned parameters from the **HIQUEL** terminal indicate:

STATUS (16-bit) This 16-bit word defines the bits 0..8 for the status of a key (1=key pressed, 0=key not pressed). The word is transmitted with the lowest byte first.

The keys refer to the following bit numbers:

 0	 1	 2
 3	 4	 5
 6	 7	 8

TYPE=0x90 Input

This protocol starts the input at the terminal. The parameters indicate the position of the cursor during the input, the length of the input, the decimal places, the maximum value and the default value.

Protocol to the terminal:

```
´TD´ SID 0x90 0x10 HCRC X Y LEN CO MIN MAX DEF
          DCRC
```

The returned parameters from the **HIQUEL** terminal indicate:

X	8-bit X-position on the display, value between 0 and 19
Y	8-bit Y-position on the display, value between 0 and 3
LEN	8-bit length of the input
CO	8-bit number of decimal places
MIN	32-bit signed minimum value of the input
MAX	32-bit signed maximum value of the input
DEF	32-bit signed standard value of the input

If the terminal has received the protocol correctly, the number input at the desired position will be active and the terminal will respond as follows:

```
´TD´ SID 0x00 0x00 HCRC
```

TYPE=0x91 Get Input

With this protocol you can get the latest status of the input from the terminal. Transfer the following protocol to the terminal:

```
´TD´ SID 0x91 0x00 HCRC
```

The terminal will respond:

```
´TD´ SID 0x92 0x05 HCRC STATUS VALUE DCRC
```

STATUS	8-bit status of the input 00 input ended with OK 01 processing 02 input cancelled
VALUE	32-bit signed response value of the input

TYPE=0x92 Abort Input

You can cancel the active input at the terminal with this protocol. Transfer the following characters to the terminal:

```
´TD´ SID 0x92 0x00 HCRC
```

If the terminal has not received the protocol, the input will be cancelled and the terminal will respond as follows:

```
´TD´ SID 0x00 0x00 HCRC
```

TYPE=0xF0 Define Character

You can create one new character by using this protocol. There are 8 characters which can be changed.

Transfered protocol to the **HIQUEL** terminal:

```
´TD´ SID 0xF0 0x09 HCRC CHAR BITMAP DCRC
```

The parameter CHAR defines the to be changed character. Values between 0x00 and 0x07 are allowed.

The parameter BITMAP defines 8 bytes but just the lowest 5 bits are valid. These seven bytes define the new character.

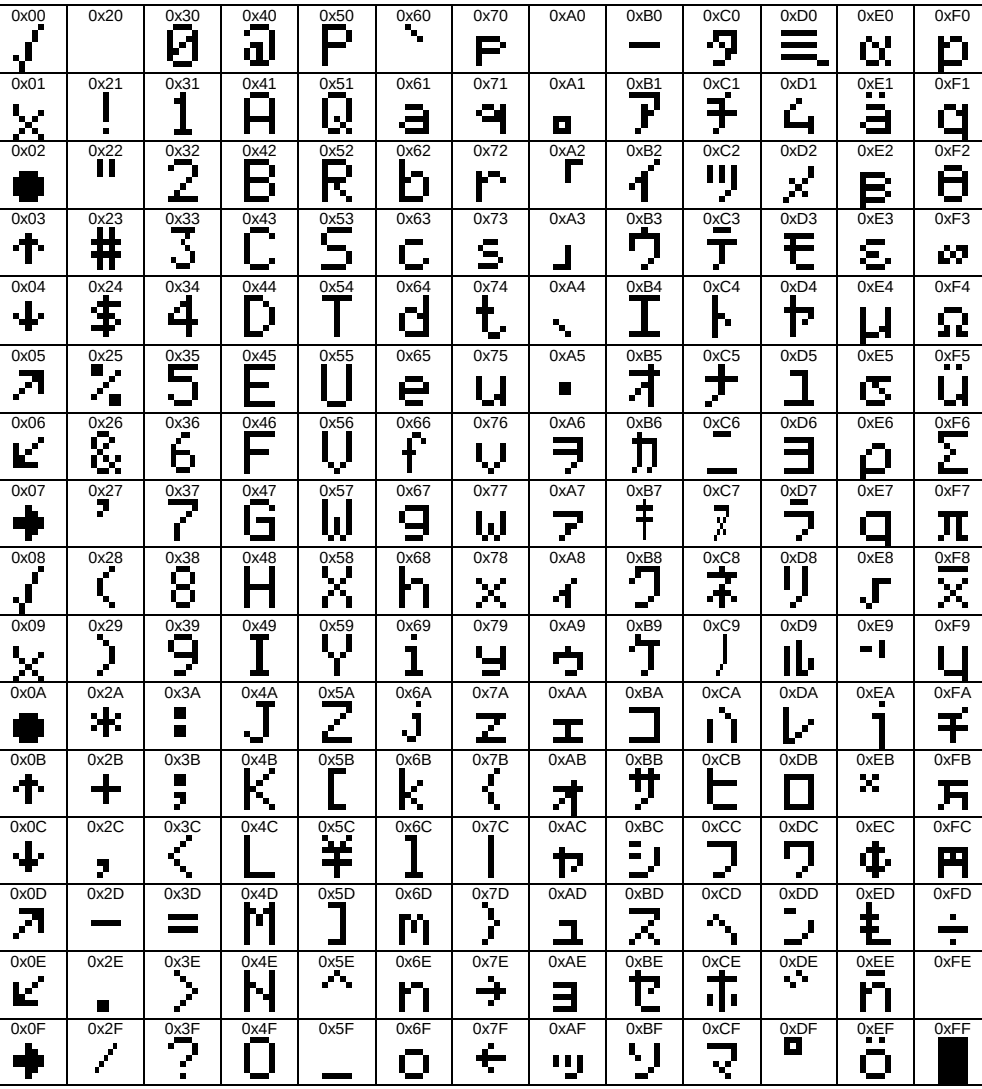
If the transfer is successful, the terminal will respond with the ACKNOWLEDGE protocol:

```
´TD´ SID 0x00 0x00 HCRC
```

If defining the character was successful it will be saved beyond swich off.

Characters

The following **HIQUEL-TERM4** characters are available after purchasing:



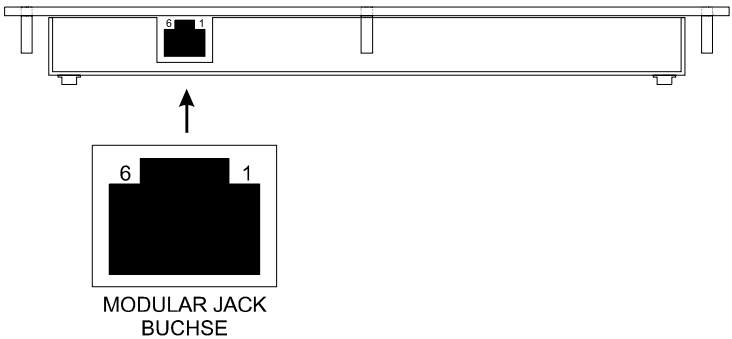
Technical information

The following chapter gives you detailed technical information about the **HIQUEL-TERM4** devices.

MODULAR JACK-socket

On the rear of the Term4 you will find the 6 pole MODULAR JACK-socket with the following signals:

ATTENTION: Always use original **HIQUEL-TERM4** cable for connecting the terminal with your host system.



TERM4-Pin	Signal	Description
1 pink	+24V	Zoom voltage supply +24VDC
2 grey	GND	Voltage Supply Ground
3 yellow	DI	Digital erase input (+24V)
4 green	GND	RS232-Interface Ground
5 brown	RXD	RS232-Interface Receive Data
6 white	TXD	RS232-Interface Transmit Data

You have to use the following cabel if you want to operate with devices which contain a 9 pole standard DSUB hub in order to communicate via RS232:

TERM4 Pin	Signal		DSUB Pin	Signal
1 pink	+24V			+24V
2 grey	GND			GND
3 yellow	DI			DI
4 green	GND	Connect with	5	GND
5 brown	RXD	Connect with	3	TXD
6 white	TXD	Connect with	2	RXD

All other pins of the DSUB hub remain empty. Of course you have to connect a supply voltage (+24VDC) with TERM4 pins 1 and 2.

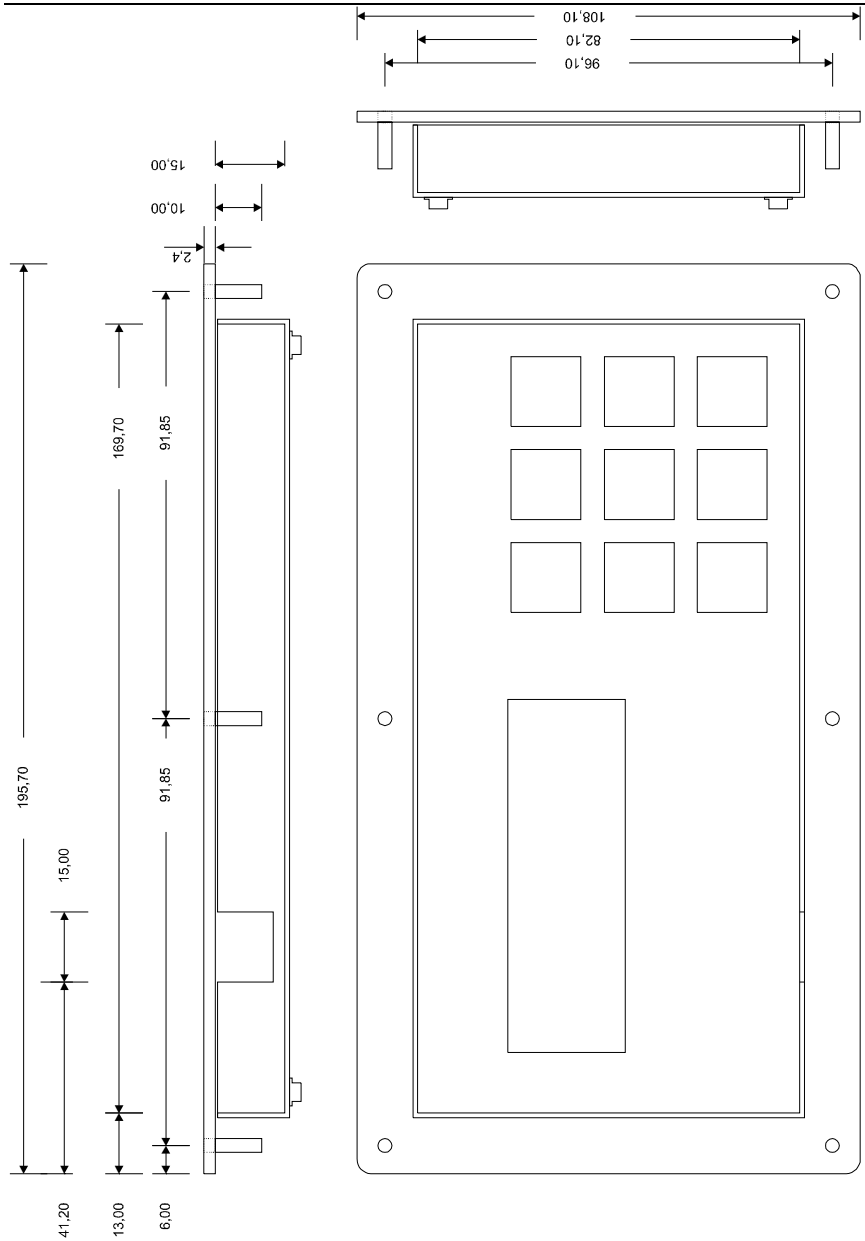


Fig: Measurements for **HIQUEL-TERM4**

Additional components

You can order the following products:

TERM4-MAN-D: User's manual for programming **HIQUEL-TERM4** or **HIQUEL-TERM4B** in German.

TERM4-MAN-E: User's manual for programming **HIQUEL-TERM4** or **HIQUEL-TERM4B** in English.

TERM4-CONN: Connection cable for **HIQUEL-TERM4** with a host system (open end).

HIQUEL-TERM4: Standard universal text display.

HIQUEL-TERM4B: Extended universal text display with buzzer and cyrillic font.

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