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Sales & Service

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1. Introduction

The Kuhnke dialog terminals KDT 635 and KDT 633 have been developed for menu-driven machine operation. The use of these terminals makes operating state messages possible as well as the entering of new settings into the control by the machine operating personnel.

Their low construction, high protection (IP 65), low heat dissipation and high durability make them well-adapted to a mounting in close approximation to machines. Data transfer between terminal and control is effected via a V.24 interface.

Advantages of operator prompting

- Dialog-oriented communication between man and machine
- Digital input and output of the processing parameters
- Plaintext error diagnosis
- Graphic visualization of the process

MONIT or TEBES

In the shape of MONIT, a convenient software package is available for creating pictures, masks and texts.

This program supports the communication between the control terminals and all Kuhnke controls as well as those capable to follow the 3964-R protocol.

TEBES is the follower of MONIT. TEBES runs under Windows and therefore more transparent for the user. An integrated simulation program allows to simulate the pictures on the PC in online operation with the connected controller.

Einführung

Operating modes

In combination with Kuhnke controls and MONIT, the terminals can be operated in two modes:

- Master mode

The terminal is directly connected to the programming interface. No further arrangements have to be made in the user program.

- Slave mode

Only possible in combination with the controls KUAX 657, 657P and 653W. Communication is effected via a slave processor with its own interface. All graphics and graphic data are stored in the memory of the slave processor.

2. Safety and Reliability

2.1. Target group

This instruction manual contains all information necessary for the use of the described product (control device, software, etc.) according to instructions. It is written for the **personnel of the construction, project planning, service and commissioning departments**. For proper understanding and error-free application of technical descriptions, instructions for use and particularly of notes of danger and warning, **extensive knowledge of automation technology** is compulsory.

2.2. Reliability

Reliability of Kuhnke controllers is brought to the highest possible standards by extensive and cost-effective means in their design and manufacture.

These include:

- selecting high-quality components,
- quality arrangements with our sub-suppliers,
- measures for the prevention of static charge during the handling of MOS circuits,
- Worst Case dimensioning of all circuits,
- inspections during various stages of fabrication,
- computer aided tests of all assembly groups and their efficiency in the circuit,
- statistic assessment of the quality of fabrication and of all returned goods for immediate taking of corrective action.

Despite these measures, the occurrence of errors in electronic control units - even if most highly improbable - must be taken into consideration.

Safety and Reliability

2.3. Notes

Please pay particular attention to the additional notes which we have marked by symbols in this instruction manual:

2.3.1. Danger



This symbol warns you of dangers which may cause death, (grievous) bodily harm or material damage if the described precautions are not taken.

2.3.2. Dangers caused by high contact voltage



This symbol warns you of dangers of death or (grievous) bodily harm which may be caused by high contact voltage if the described precautions are not taken.

2.3.3 Important information / cross reference



This symbol draws your attention to important additional information concerning the use of the described product. It may also indicate a cross reference to information to be found elsewhere.

2.4. Safety

Our product normally becomes part of larger systems or installations. The following notes are intended to help integrating the product into its environment without dangers for man or material/equipment.

2.4.1. To be observed during project planning and installation



- 24V DC power supply:
Generate as electrically safely separated low voltage. Suitable devices are, for example, split transformers constructed to correspond to European standard EN 60742 (corresponds to VDE 0551)
- In case of power breakdowns or power fades: the program has to be structured in such a way as to create a defined state at restart that excludes dangerous states.
- Emergency switch-off installations or other emergency installations have to be realized in accordance with EN 60204/IEC 204 (VDE 0113). They must be effective at any time.
- Safety and precautions regulations for qualified applications have to be observed.
- Please pay particular attention to the notes of warning which, at relevant places, will make you aware of possible sources of dangerous mistakes or failures.
- The relevant standards and VDE regulations are to be observed in every case.
- Control elements have to be installed in such a way as to exclude unintended operation.
- Control cables have to be laid in such a way as to exclude interference (inductive or capacitive) which could influence the operation of the controller.



To achieve a high degree of conceptual safety in planning and installing an electronic controller it is essential to follow the instructions given in the manual exactly because wrong handling could lead to rendering measures against dangerous failures ineffective or to creating additional dangers.

Safety and Reliability

2.4.2. To be observed during maintenance and servicing

- Precaution regulation VBG 4.0 must be observed, and §8 (Admissible deviations during working on parts) in particular, when measuring or checking a controller in a power-up condition.
- Repairs must only be made by specially trained Kuhnke staff (usually in the main factory in Malente). Warranty expires in every other case.
- Spare parts:
Only use parts approved of by Kuhnke. Only genuine Kuhnke modules must be used in modular controllers.
- Modules must only be connected to or disconnected from the controller with no voltage supplied. Otherwise they may be destroyed or (possibly not immediately recognizably!) detracted from their proper functioning.
- Always deposit batteries and accumulators as hazardous waste.

2.5. Electromagnetic compatibility

2.5.1. Definition

Electromagnetic compatibility is the ability of a device to function satisfactorily in its electromagnetic environment without itself causing any electromagnetic interference that would be intolerable to other devices in this environment.

Of all known phenomena of electromagnetic noise, only a certain range occurs at the location of a given device. This noise depends on the exact location. It is determined in the relevant product standards.

The international standard regulating construction and degree of noise resistance of programmable logic controllers is IEC 1131-2 which, in Europe, has been the basis for European standard EN 61131-2.

2.5.2. Resistance to interference

- Electrostatic discharge, ESD
in accordance with IEC 801-2, 3rd degree of sharpness
- Fast transient interference, Burst
in accordance with IEC 801-4, 3rd degree of sharpness
- Irradiation resistance of the device, HF
in accordance with IEC 801-3, 3rd degree of sharpness
- Immunity to damped oscillations
in accordance with IEC 255-4 (1 MHz, 1 kV)

Safety and Reliability

2.5.3. Interference emission

- Interfering emission of electromagnetic fields, HF
in accordance with EN 55011, limiting value class A, group 1



If the controller is designed for use in residential districts, then high-frequency emissions must comply with limiting value class B as described in EN 55011.

Appropriate means for keeping the corresponding limiting values are fitting the controller into an earthed metal cabinet and equipping the supply cables with filters.

2.5.4. General notes on installation

As component parts of machines, facilities and systems, electronic control systems must comply with valid rules and regulations, depending on the relevant field of application.

General requirements concerning the electrical equipment of machines and aiming at the safety of these machines are contained in Part 1 of European standard EN 60204 (corresponds to VDE 0113).



For safe installation of our control system please observe the following notes:

2.5.5. Protection against external electrical influences

Connect the control system to the protective earth conductor to eliminate electromagnetic interference. Ensure practical wiring and laying of cables.

2.5.6. Cable routing and wiring

Separate laying of power supply circuits, never together with control current loops:

- DC voltage 60 V ... 400 V
- AC voltage 25 V ... 400 V

Joint laying of control current loops is permissible:

- data signals, shielded
- analog signals, shielded

- digital I/O lines, unshielded
- DC voltages < 60 V, unshielded
- AC voltages < 25 V, unshielded

Safety and Reliability

2.5.7. Location of installation

Make sure that there are no impediments due to temperatures, dirt, impact, vibrations and electromagnetic interference.

Temperature

Consider heat sources such as general heating of rooms, sunlight, heat accumulation in assembly rooms or control cabinets.

Dirt

Use suitable casings to avoid possible negative influences due to humidity, corrosive gas, liquid or conducting dust.

Impact and vibration

Consider possible influences caused by motors, compressors, transfer routes, presses, ramming machines and vehicles.

Electromagnetic interference

Consider electromagnetic interference from various sources near the location of installation: motors, switching devices, switching thyristors, radio-controlled devices, welding equipment, arcing, switched-mode power supplies, converters/inverters.

2.5.8. Particular sources of interference

Inductive actuators

Switching off inductances (such as from relais, contactors, solenoids or switching magnets) produces overvoltages. It is necessary to reduce these extra voltages to a minimum.

Reducing elements may be diodes, Z-diodes, varistors or RC elements. To provide suitably designed reducing elements, we recommend asking the manufacturer or supplier of the corresponding actuators for the relevant information.

3. Hardware

3.1. □□□ 635

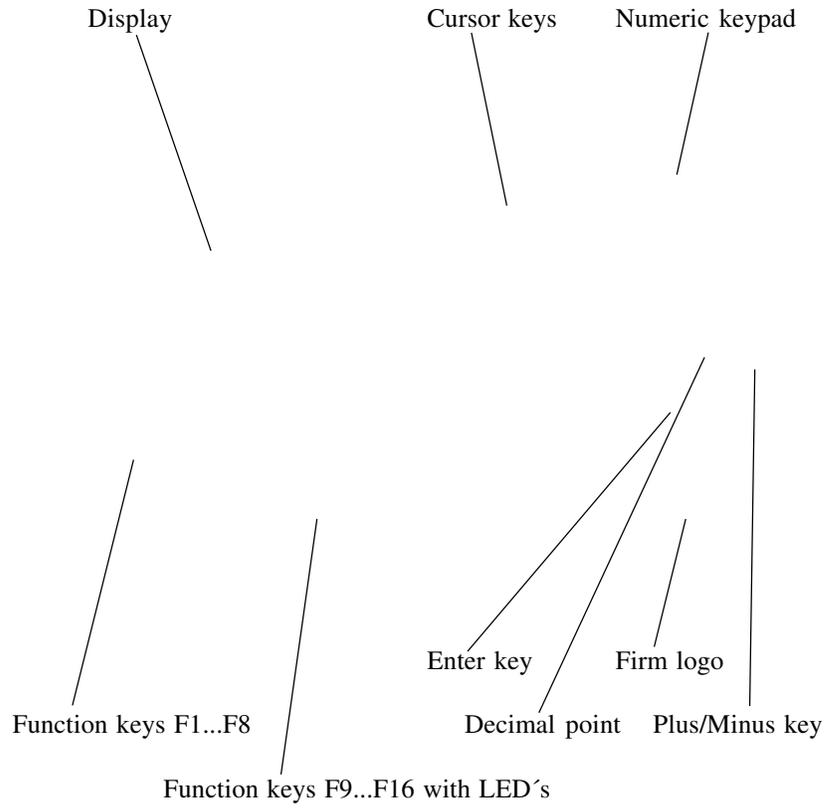
For an overview of the technical specifications see appendix
“A. Technical specifications”.

3.1.1. □□□□□□□

Hardware

3.1.2. □□□□□□□□ □□ □□□□□□ □□□□□□□□

3.1.2. 000000 0000



Hardware

3.1.3.1. 000000 00 000 00000000 0000, 0000 00000

The firm logos and the labels of the functions keys are exchangeable. They are slid behind the foil cover as foil strips. For this the rear panel of the KDT 635 has to be taken off. It is mounted with five M3 nuts.

3.1.4. 000 00000

Key	F1	F2	F3	F4	F5	F6	F7	F8	F9
Code	11	12	13	14	18	19	1A	1B	01
Release code	91	92	93	94	98	99	9A	9B	81
Key	F10	F11	F12	F13	F14	F15	F16		
Code	02	03	04	08	09	0A	0B		
Release code	82	83	84	88	89	8A	8B		
Key	←	↑	→	↓		.	+/-	Enter	0
Code	2D	2C	2E	2F		29	2B	23	30
Key	1	2	3	4	5	6	7	8	9
Code	31	32	33	34	35	36	39	38	39

The key codes are given in hexadecimal values.



The function keys F1-F16 provide a so-called release code when released. This can be used for realizing control functions, e.g. typing mode.

3.15. 00000000 00000

The key combination

<F1><+/->

restarts the KDT 635.

3.16. 0000000000 00000000

To increase the brightness:

- Press and hold key F1
- Press key ↑ as often as necessary to set the brightness
- Release key F1

To decrease the brightness:

- Press and hold key F1
- Press key ↓ as often as necessary to set the brightness
- Release key F1

3.17. 00000 00000000 0000000000 (0000 000000)

For this, hook switch S1 (at the rear panel, behind the flap, cf. 3.1.) has to be set:

- 128 KByte S1 open
- 256 KByte S1 closed
- 512 KByte S1 closed

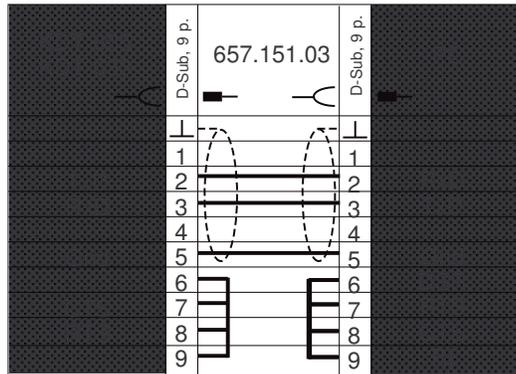
S2 must always remain closed (only for checking purposes).

Hardware

3.1.8. □□□□□□□□ □□□□□□

3.1.8.1. □□□ 635 <□> □□

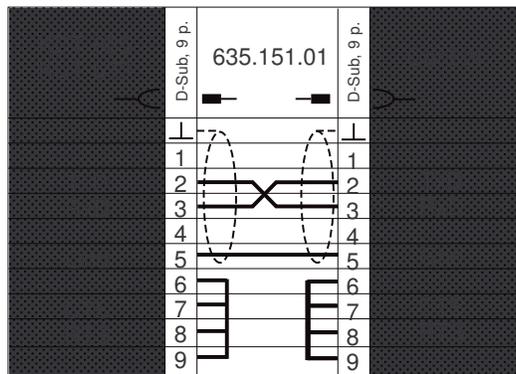
For programming:



Order number: 657.151.03

3.1.8.2. □□□ 635 <□> □□□□□□ (□□ 232 □□□□ □□□□□□□□)

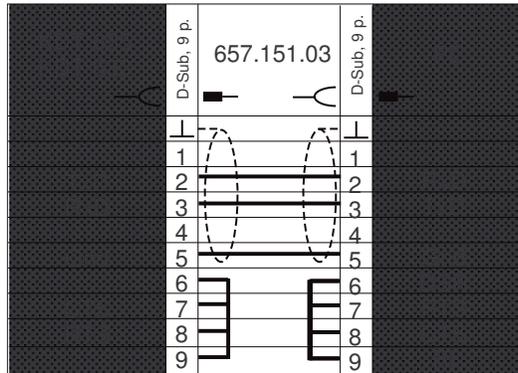
For communication via KUBES protocol:



Order number: 635.151.01

3.1.8.3. 635 <> 0.24000000

For communication via V.24 slave:



Order number: 635.151.02

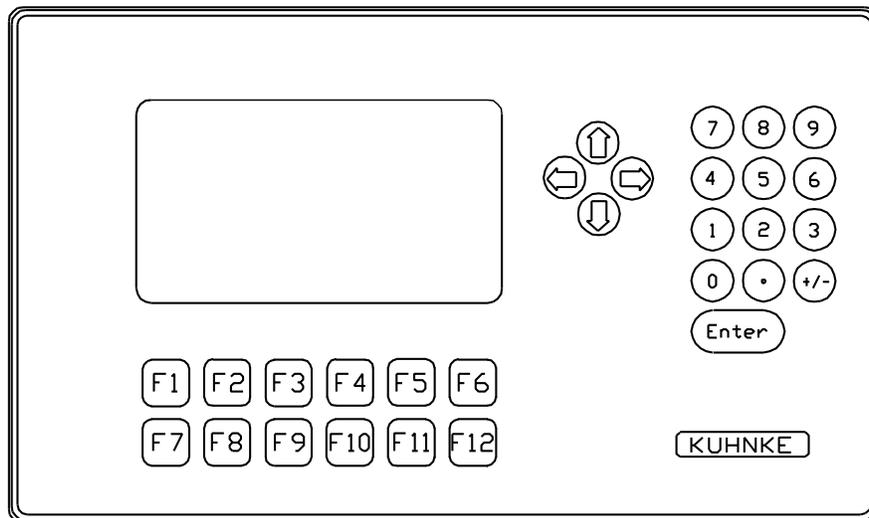
Hardware

3-8

3.2. KDT 633

For an overview of the technical specifications see appendix "A. Technical specifications".

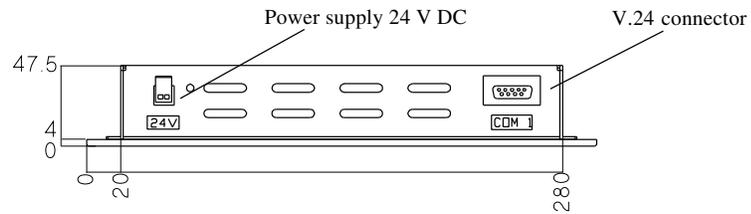
3.2.1. Diagram



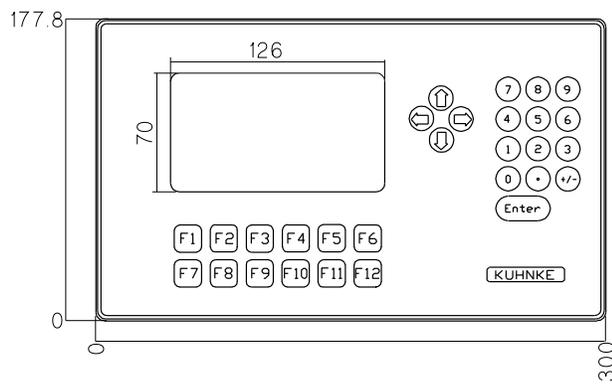
Hardware

3.2.2. Dimensions, mounting dimensions

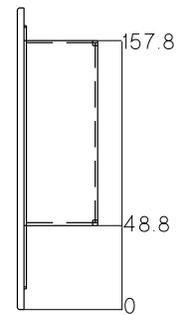
Top view:



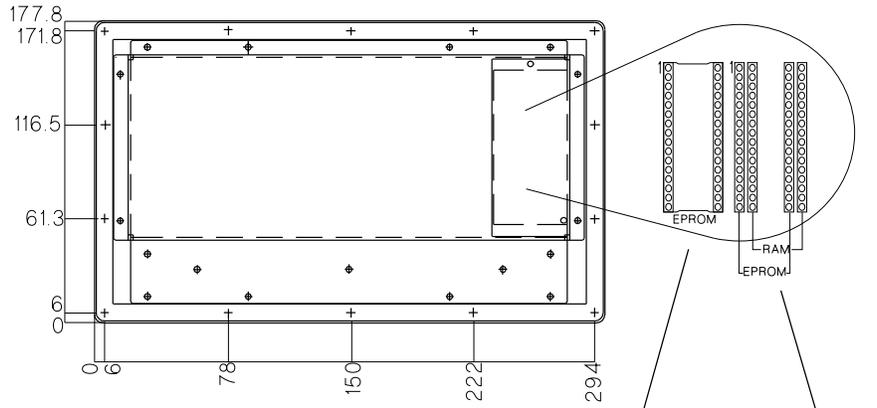
Front view:



Side view

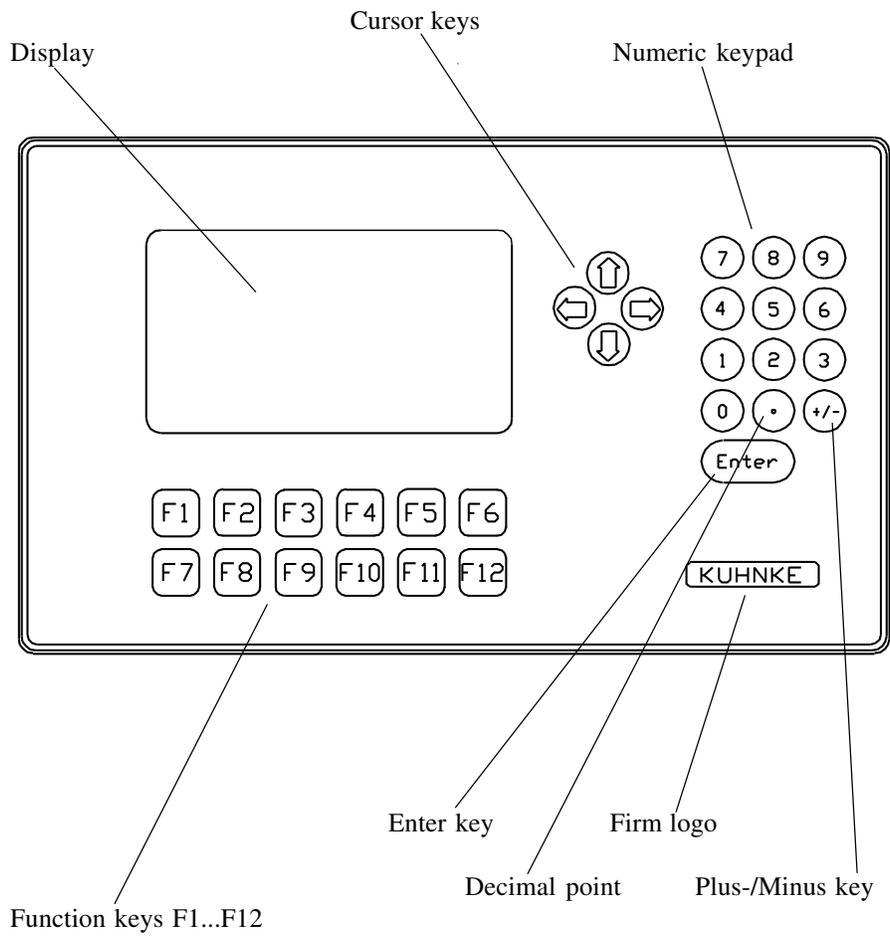


Rear view:



Memory slots: Monitor Data memory

3.2.3. Front view



Hardware

3.2.3.1. Labels of the function keys, firm logos

The firm logos and the labels of the function keys are permanently fixed and are therefore not exchangeable. There is the option, however, to deliver the KDT 633 with customer-defined labels and front color.

3.2.4. Keycodes

Key	F1	F2	F3	F4	F5	F6	F7	F8	F9
Code	11	12	13	14	18	19	1A	1B	01
Release code	91	92	93	94	98	99	9A	9B	81
Key	F10	F11	F12						
Code	02	03	04						
Release code	82	83	84						
Key	←	↑	→	↓		.	+/-	Enter	0
Code	2D	2C	2E	2F		29	2B	23	30
Key	1	2	3	4	5	6	7	8	9
Code	31	32	33	34	35	36	39	38	39



The keycodes are given in hexadecimal values.

The function keys F1-F12 produce a so-called release code when released. This can be used for realizing control functions, e.g. typing mode.

3.2.5. □□□□□□□□ □□□□

The key combination

<F1><+/->

restarts the KDT 633.

3.2.6. The Setup menu

The Setup menu is used to adjust the terminal and to test its functions.

Start setup:

<F1><•>

Sometimes it can be necessary to reset the terminal before starting the setup (see "3.2.5....").

The setup menu looks as follows:

Setup KDT633	
Uhr	Ze 09:14:41 Da 04.09.95
Anzeige	He 020 Cg 8 In - Bl -
Tastatur	Sw 350 Ww 250 Wi +
LED/Datei	BW 400 Ko -
Seriell 1	Ba 9600 Da 8 Pa 0 St 1
Sonstiges	Grundeinstellung
Ende	

Settings

- select: <=> oder <=>
- change: <↓> oder <↑>

Functions

- select: <↓> or <↑>



The cursor keys of the terminal are used. The chosen function is displayed invers (see function "Uhr"). The following pages describe the functions and translate the german expressions to english.

Hardware

3.2.6.1. Function Clock (Uhr)

Adjusts time and date:

- Ze (Time): <hour>:<minut>:<second>
- Da (Date): <day>.<month>.<year>

Deviation: ca. 1 sec per day

3.2.6.2. Function Display (Anzeige)

Adjusts the display:

- He (LCD brightness): value from ~20...~50
- Cg (Cursor size): value from 1...8
- In (Inverse display): normal <->, inverse <+>
- Bl (Flashing cursor): normal <->, flashing <+>



The brightness can also be adjusted outside the setup function in normal mode: <F1><↑> or <F1><↓>

3.2.6.3. Function Keyboard (Tastatur)

Adjusts the keyboard delay (this is the time a key has to be pressed until it is recognized) and the repeat function (repeat during key pressing):

- Sw (Keyboard delay): value from 250...950 ms
- Ww (Repeat rate): value from 1...8
- Wi (Repeat on-off): off <->, on <+>

3.2.6.4. Function LED/File (LED/Datei)

Adjusts the flashing rate (pulse time = pause time) of the LED's in the function keys and the file compressing (to increase the capacity):

- Bw (Flashing rate): value from 50...950 ms
- Ko (Compressing on-off): off <->, on <+>

3.2.6.5. Function Serial 1 (Seriell 1)

Adjusts the interface:

- Ba (Baudrate): value 1200...19200
 - Da (Number of data bits): value 7 oder 8
 - Pa (Parity check): even <E>, odd <O>, no <N>, space <S>
 - St (Number of stop bits): value 1 oder 2
- Base settings: 9600, 8, O, 1

3.2.6.5. Function Miscellaneous (Sonstiges)

This topic hides several functions:

- Choose function: <↓> or <↑>
- Start function: <Enter>

Functions:

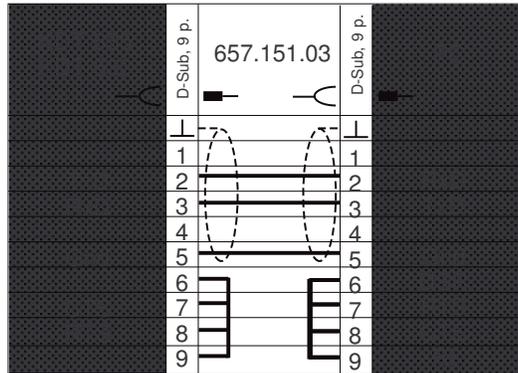
- Grundeinstellung: base setting for all previously described functions
- letzter Fehler: shows the last failure
- Bilder-RAM löschen: erases the data memory
- Bit-RAM prüfen: checks the memory
- Tastaturtest: checks the keyboard
- Zeichensatz zeigen: shows the actual character set
- Dauertest: test function for factory tests
finish test function: <F2>

Hardware

3.2.7. Connector cables

3.2.7.1. KDT 633 <-> PC

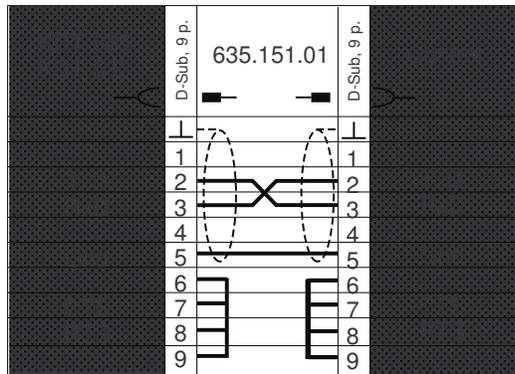
For programming:



Bestellnummer: 657.151.03

3.2.7.2. KDT 633 <-> Control (RS 232 with KUBES protocol)

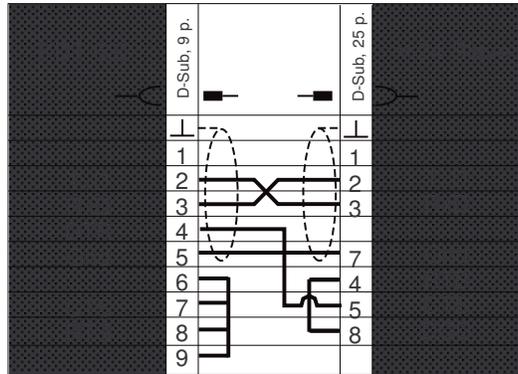
For communication via KUBES protocol:



Bestellnummer: 635.151.01

3.2.7.3. KDT 633 <-> V.24-Slave

For communication via V.24 slave:



Dieses Kabel wird von Kuhnke nicht geliefert.

Hardware

4. Command sequences

After switching the system on every character that is transmitted to the terminal is displayed on the screen. An exception are special characters which either represent a command or introduce one. In the latter case, the introducer is followed by further characters which specify the command in more detail. There are no more characters put out to the screen until all characters of a complete command have been received by the terminal.

Reception of unknown characters

If, within a command sequence, a character is received that does not belong to the command the command recognition is aborted and the sign "¿" is displayed on the screen.

KDT 635 and KDT 633 are programmed by using command sequences which follow the common standards of well-known terminal manufacturers. Each command sequence is given in its hexadecimal, decimal, and ASCII codings.

The following examples may serve as an explanation:

Hexadecimal Coding : (Hex)

ODh: hexadecimal notation of the ASCII character CR (Carriage Return). The "h" signifies hexadecimal notation. For the transfer of ODh to the terminal only one character (i.e. ASCII character CR) is transferred to the terminal.

Decimal Coding:

13: decimal notation of the ASCII character CR.

ASCII-Coding:

CR: ASCII notation of Carriage Return (cf. appendix "B.1. ASCII table").

Command sequences

Parameters

Some of the commands contain parameters. The definitions of the commands show these parameters in italics. There are different forms of parameters which are marked by an inferior character at the position of the parameter designation in italics. These marks have to be interpreted as follows:

BP: Binary parameter. The parameter consists of a character the code of which is interpreted as a numeric value.

AP: ASCII parameter. An ASCII character is expected as parameter.

NP: Numeric parameter. The parameter consists of a sequence of numbers (ASCII codes "0" - "9") which is interpreted as a whole as a numeric value in decimal notation. Example: the transfer of the characters "0" and "1" in sequence is evaluated as 1; the transfer of "2", "4", "6" is interpreted as 246 (decimal).

TP: Textparameter. The parameter consists of a sequence of ASCII characters which is generally terminated by a special final character. The character sequence is interpreted as text.

4.1. Display control

In this chapter all commands for display control are described.

4.1.1. Cursor control

Backspace	
Hex	08h
Decimal	8
ASCII	BS

This command moves the cursor by one character position to the left; the character at the resulting cursor position is deleted. The cursor does not move if it is at the most left-hand character position already.

Cursor left	
Hex	06h
Decimal	6
ASCII	ACK

This command moves the cursor by one character position to the left. The cursor does not move if it is at the most left-hand character position already.

Cursor right	
Hex	0Ch
Decimal	12
ASCII	FF

The cursor moves one position to the right. If the cursor is caused to exceed the most right-hand character position it moves to the beginning of the next line. If the cursor is at the end of the last line of the scroll area, this command produces a scroll-up by one line.

Command sequences

Tabulation
Hex 09h Decimal 9 ASCII HT

This command moves the cursor right to the next horizontal position which can be divided by 8. The cursor does not move if it is at or behind the last such position in a line already.

Cursor up
Hex 0Bh Decimal 11 ASCII VT

The cursor moves one line up unless it is in the topmost line of the writing area already. In this case it stays at its current position. This is also applicable if the cursor is in the topmost line of the writing area.

Cursor down with scroll
Hex 0Ah Decimal 10 ASCII LT

The cursor moves one line down unless it is in the bottom line of the writing area already. If the cursor is in the last line of the scroll area, this command causes a scroll-up by one line.

Display control

Cursor up with scroll			
Hex	1Bh	6Ah	
Decimal	27	106	
ASCII	ESC	J	

The cursor moves one line down unless it is in the top line of the writing area. If the cursor is in the upper line of the scroll area, this command causes a scroll-down by one line.

Cursor to the left margin ("Carriage return")	
Hex	0Dh
Decimal	13
ASCII	CR

The cursor moves to the leftmost character position of the current line.

Cursor home (Cursor in start position)	
Hex	1Eh
Decimal	30
ASCII	RS

The cursor is positioned in the upper left corner of the writing area.

Cursor home in scroll region (possible only with KDT 635)			
Hex	1Bh	1Bh	48h
Decimal	27	27	72
ASCII	ESC	ESC	H

The cursor is positioned in the upper left corner of the scroll area.

Command sequences

Direct cursor positioning				
Hex	1Bh	1Dh	ZBP	SBP
Decimal	27	61	ZBP	SBP
ASCII	ESC	=	ZBP	SBP

The cursor is positioned at the position of the writing area described by (ZBP,SBP). The top left corner of the writing area has the character position (0,0). ZBP and SBP are defined by the desired coordinates and the addition of 32 (decimal).

This is the only command by which the cursor can be positioned outside the set scroll area.

Example: 1Bh 1Dh 20 20

This command brings the cursor to position (0,0) of the writing area.

Readout of the cursor position		
Hex	1Bh	3Fh
Decimal	27	63
ASCII	ESC	?

After the terminal has received this command it reports the current cursor position to the connected computer. The line position is transferred first followed by the column position. In the terminal, 32 (decimal) is added to each value and the resulting ASCII code is transferred to the computer. This is followed by a CR (Carriage Return, 0Dh) character.

Example: 20h 20h 0Dh
Cursor position = (0, 0)

4.1.2. Clearing and insertion commands

Clear screen and cursor home					
Hex	1Ah	or 1Bh	2Ah	or 1Bh	3Bh
Decimal	26	or 27	42	or 27	59
ASCII	SUB	or ESC	*	or ESC	;

The screen is cleared and the cursor moves into the upper left corner of the screen.

Clear scroll area and cursor home (possible only with KDT 635)			
Hex	1Bh	1Bh	2Ah
Decimal	27	27	42
ASCII	ESC	ESC	.

The scroll area is cleared and the cursor is positioned in the upper left corner of the scroll area.

Line delete from cursor position				
Hex	1Bh	54h	or 1Bh	74h
Decimal	27	84	or 27	116
ASCII	ESC	T	or ESC	t

Starting from the cursor position, the current line is deleted to the right-most character position.

Clear screen from cursor position		
Hex	1Bh	59h
Decimal	27	89
ASCII	ESC	Y

Starting from the cursor position, the writing area is cleared to the lower right corner.

Command sequences

Insert line		
Hex	1Bh	45h
Decimal	27	69
ASCII	ESC	E

A blank line is inserted in the cursor line. The contents of the current as well as of all following lines is moved down by one line. This causes the loss of the contents of the lower line of the scroll area or, if the cursor is outside the scroll area, of the writing area. The cursor position is not affected by this command.

Line delete		
Hex	1Bh	52h
Decimal	27	82
ASCII	ESC	R

The cursor line is deleted and the contents of the lines below moves up by one line. After this, the lower line of the scroll area or, if the cursor is outside the scroll area, of the writing area is empty.

4.1.3. Character and cursor attributes

Character attribute assignment			
Hex	1Bh	5Eh	ATTRAP
Decimal	27	94	ATTRAP
ASCII	ESC	^	ATTRAP

With this command, individual character attributes can be assigned. All characters after this command are noted with this attribute until a new attribute command alters the current character attribute. The command does not affect characters which are on the screen already.

The parameter *ATTRAP* can take on the following values:

<i>ATTRAP</i>	Function
0	Reset of all attributes
2	Activate flashing
3	Deactivate flashing
4	Activate inverse
5	Deactivate inverse

the following are possible only with KDT 635:

8	Activate underlining
9	Deactivate underlining

Command sequences

Mixed character attribute assignment			
Hex	1Bh	47h	ATTRAP
Decimal	27	73	ATTRAP
ASCII	ESC	G	ATTRAP

With this command, mixed character attributes can be assigned. All characters after this command are noted with this attribute until a new attribute command alters the current character attribute. The command does not affect characters which are on the screen already.

The parameter *ATTRAP* can take on the following values:

<i>ATTRAP</i>	Function
0	Reset of all attributes
1	Assign character attributes as in the last "ESC G" sequence
2	Deactivate flashing
3	Activate flashing
4	Activate inverse
5	Deactivate inverse
6	Activate inverse and flashing
7	Deactivate inverse and flashing

the following are possible only with KDT 635:

8	Activate underlining
9	Deactivate underlining
:	Activate flashing and underlining
;	Deactivate flashing and underlining
<	Activate inverse and underlining
=	Deactivate inverse and underlining
>	Activate inverse, flashing and underlining
?	Deactivate inverse, flashing and underlining

Display control

Deactivate cursor marker				
Hex	1Bh	2Eh	30h	
Decimal	27	46	48	
ASCII	ESC	.	0	

Usually, the current cursor position is shown on the screen by a marker. With this command, the marker display can be suppressed.

Activate cursor marker				
Hex	1Bh	2Eh	31h	
Decimal	27	46	49	
ASCII	ESC	.	1	

This command makes the cursor marker visible.

4.1.4. Text display (possible only with KDT 635)

Depending on the memory configuration, the screen memory of the KDT 635 can store up to 4 screens simultaneously between which can be switched instantaneously (without a new screen creation by the host computer). Each screen has its own cursor position and its own current character attribute. All of the screens can be operated separately in 2 different display modes.

Select screen for display				
Hex	1Bh	4Dh	PAGENP	3Bh
Decimal	27	77	PAGENP	59
ASCII	ESC	M	PAGENP	;

The parameter PAGE contains the number of the screen to be selected for display. The pages are numbered successively, starting at zero.

After switching the terminal on, page 0 is selected

Command sequences

4.1.5. Status line (possible only with KDT 635)

The upper or lower line can be used as a status symbol. The contents of the status line is not moved during scroll operations. If one of the two lines is defined as status line, its contents is only influenced by special commands and cannot be influenced by normal writing operations on the screen. After switching on, the upper screen line is defined as status line.

Select definition of the status line					
Hex	1Bh	1Bh	73H	MODEAP	3Bh
Decimal	27	27	115	MODEAP	59
ASCII	ESC	ESC	S	MODEAP	;

The ASCII parameter *MODE* indicates whether a screen line and, if so, which is used as status line.

The following parameter values are accepted:

MODEAP	Function
0	There is no status line being used. Up to 25 lines are available as writing area. Cursor home position and "upper left screen corner" is now the first character position in the first line of the screen.
1	The uppermost line is used as status line. It is cleared and deactivated. Cursor home position and "upper left screen corner" is now the first character position in the second line of the screen.
2	The bottom line is used as status line. It is cleared and deactivated. Cursor home position and "upper left screen corner" is now the first character position in the first line of the screen.

This definition is valid for all screens simultaneously.

Status line programming				
Hex	1Bh	66h	TEXTTP	0Dh
Decimal	27	102	TEXTTP	13
ASCII	ESC	f	TEXTTP	CR

The status line is written on by the contents of the TEXT parameter. If you want the end-of-line character CR to be contained in TEXT, you have to transfer it twice, one after the other.

If more than 80 characters are transferred as TEXT, the superfluous characters are ignored. However, the end-of-line character CR must be transferred in any case.

TEXT is noted with the character attributes as they were assigned before transferring this command.

TEXT may contain special control characters which are explained in the following example:

Backspace	
Hex	08h
Decimal	8
ASCII	BS

The preceding character in TEXT is overwritten by the character following this command.

To set the write position		
Hex	09h	POSBP
Decimal	9	POSBP
ASCII	HT	POSBP

The position of the internal cursor can be directly influenced by this control code. The POSBP value is determined by the target write position in the status line to which 32 (decimal) is added. The leftmost write position is 0, the rightmost position is 39 or 79 resp. (both decimal).

Command sequences

Activate status line			
Hex	1Bh	67h	
Decimal	27	104	
ASCII	ESC	g	

This displays the contents of the status line. The command has no effect if there is no line defined as status line. The same status line is displayed on all screen pages.

Deactivate status line			
Hex	1Bh	68h	
Decimal	27	104	
ASCII	ESC	h	

The status line is deactivated. The contents of the status line is not deleted by this command.

Clear status line			
Hex	1Bh	1Bh	59h
Decimal	27	27	89
ASCII	ESC	ESC	Y

The status line is overwritten by spaces of the current character attribute.

4.1.6. Scroll area (possible only with KDT 635)

After switching on, the write area of the screen is the so-called scroll area. If this is left by means of cursor control commands (line feed in the last screen line etc.) the contents of the screen moves one line up or down. This is called "scrolling" the screen.

The line range of the scroll area can be altered by special commands, however. During normal operation, the scroll area can only be left with absolute, but never with relative, cursor position.

In one special case, i.e. the origin mode, the scroll area cannot be left by any positioning command. In this case, the "upper left screen corner" (cursor position 0,0) is in the upper left corner of the scroll area. If, in the origin mode, the scroll area is re-defined, a home jump of the cursor may be effected so that the cursor stays in the scroll area.

Scroll area programming						
Hex	1Bh	5Bh	Z1NP	3Bh	Z2NP	72h
Decimal	27	91	Z1NP	59	Z2NP	114
ASCII	ESC	(	Z1NP	;	Z2NP	r

This command can be used to re-define the scroll area. It then goes from line Z1 to line Z2. The first line of the writing area is line 0.

Command sequences

Activate origin mode					
Hex	1Bh	5Bh	3Fh	36h	68h
Decimal	27	91	63	54	104
ASCII	ESC	(	?	6	h

This activates the origin mode. If the cursor is outside the scroll area, it is reset to home position (upper left corner of the scroll area).

Deactivate origin mode					
Hex	1Bh	5Bh	3Fh	36h	6Ch
Decimal	27	91	53	54	108
ASCII	ESC	(	?	6	l

This deactivates the origin mode. The cursor can now be positioned in the entire writing area with absolute positioning.

4.2. Realtime clock

The following commands are related to setting and reading out the built-in realtime clock.

4.2.1. Date

Set date										
Hex	1Bh	1Bh	53h	44h	DNP	3Ah	MNP	3Ah	YNP	3Bh
Decimal	27	27	83	68	DNP	58	MNP	58	YNP	59
ASCII	ESC	ESC	S	D	DNP	:	MNP	:	YNP	;

This command sets the date in the realtime clock. Day (*DNP*), month (*MNP*) and year (*YNP*) are transferred to the terminal.

Example: 1Bh 1Bh 53h 44h 31h 34h 3Ah 31h 32h 3Ah 39h 30h 3Bh
 The date is set to the 14/12/90.

Read date				
Hex	1Bh	1Bh	47	44h
Decimal	27	27	71	68
ASCII	ESC	ESC	G	D

The current date is transferred to the host computer. Day, month, and year are transferred, separated by a full stop character ("x", Hex 2Eh), and followed by a CR character (Hex 0Dh).

Command sequences

4.2.2. Time

Set time										
Hex	1Bh	1Bh	53h	54h	HNP	3Ah	MNP	3Ah	SNP	3BH
Decimal	27	27	83	84	HNP	58	MNP	58	SNP	59
ASCII	ESC	ESC	S	T	HNP	:	MNP	:	SNP	;

This command sets the time in the realtime clock. Hours (HNP), minutes (MNP), and seconds (SNP) are transferred to the terminal.

Example: 1Bh 1Bh 53h 54h 31h 33h 3Ah 30h 30h 3Ah 33h 30h 3Bh
 The time is set to 12:00:30.

Read time				
Hex	1Bh	1Bh	47	54h
Decimal	27	27	71	84
ASCII	ESC	ESC	G	T

The current time is transferred to the host computer. Hours, minutes, and seconds are transferred, separated by a colon (“:”, Hex 3AH), and followed by a CR character (Hex 0Dh).

4.3. Additional functions

4.3.1. RESET

Reset, system reset			
Hex	1Bh	7Eh	31h
Decimal	27	126	49
ASCII	ESC	~	1

The terminal executes a warm start.

4.3.2. Switching of LED's (light emitting diodes)

Switching of LEDs (possible only with KDT 635)							
Hex	1Bh	53h	4Ch	LEDNR	3Bh	STATUS	3Bh
Decimal	27	83	76	LEDNR	59	STATUS	59
ASCII	ESC	S	L	LEDNR	;	STATUS	;

The LED assigned to LEDNR is switched according to STATUS.

STATUS Significance

30h LED off
 31h LED on

Example: 1Bh 53h 4Ch 32h 3Bh 31h 3Bh
 The second LED is switched on.

Command sequences

4.3.3. Character set changeover

Character set changeover					
Hex	1Bh	20h	50Ch	<i>NR</i>	3Bh
Decimal	27	83	80	<i>NR</i>	59
ASCII	ESC	blank	P	<i>NR</i>	;

NR goes from \$30...\$38.

A. Technical specifications

A.1. KDT 635

Control terminal KDT 635		
Construction	Flush-type device for front panel fitting	
Protection	IP 65 (front panel)	
Dimensions WxHxD	444 x 278 x 85 mm	
Supply, power consump.	24 V DC \pm 20 %, < 500 mA	
Operation temperature	0...45 °C	
Built-in interfaces	2 x V.24 (RS232)	
-optional	RS485, 20 mA current loop	
Display	LCD, Multi-super-twisted, with cold cathode ray tube, background lighting, resolution 640 x 400 Pixel, 80 characters x 25 lines (24 textlines, 1 statusline), durability > 20000 h	
Keyboard	33 short-drop keys (optional: max. 80)	
Light emitting diodes	8 (opt. 16), in the function keys F9...F16	
Memory media		
- Monitor	EPROM 27C512 (KDT 635 Standard)	
- Data (EPROM)	EPROM 27C1001 (128 KByte), 27C2001 (256 KByte) or 27C4001 (512 KByte)	*1)
- Data (Memory Card)	128 KByte (order no. 635.180.01), 256 KByte or 512 KByte	*1) *2)
Real-time clock	Day, month, year, hour, minute, second, battery-buffered (approx. 3 years)	
Order number	635.002.00	*3)
Connector cables		
KDT 635 <-> IBM-AT	programming	
Order number	657.151.03	
KDT 635 <-> CPU	communication in master mode	
Order number	657.151.01	
KDT 635 <-> V.24-Slave	communication in slave mode	
Order number	653.151.02	

*1) A data memory in the KDT 635 is only required when in master mode.

*2) Each memory card has its own accu for data buffering

*3) Control terminals KDT 635 released earlier (order no. 635.001.00) are not described here.

A Monit release < 5.2 must be used for programming these devices in master mode, as the project data record is constructed differently.

Appendix A

A.2. KDT 633

Controlterminal KDT 633		
Construction	Flush-type device for front panel fitting	
Protection	IP 65 (front panel)	
Dimensions WxHxD	300 x 177.8 x 47.5	
Supply, power consump.	24 V DC \pm 20 %, < 500 mA	
Operation temperature	0...45 °C	
Built-in interface	1 x V.24 (RS232)	
-optional	RS485, 20 mA current loop	
Display	LCD, Multi-super-twisted, with cold cathode ray tube, background lighting, resolution 240 x 128 Pixel, 40 characters x 16 lines, durability > 20000 h	
Keyboard	29 short-drop keys (optional: max. 80)	
Memory media		
- Monitor	EPROM 27C512 (KDT 633 Standard)	
- Data (EPROM) *1)	EPROM 27C1001 (128 KByte) *2)	
- Data (RAM) *1)	RAM DS1245Y or DS1245AB (128 KByte), with built-in battery (10 years), type DALLAS *3)	
Real-time clock	day, month, year, hour, minute, second, battery-buffered, 1 sec deviation per day *4)	
Order number	633.001.00	
Connector cables		
KDT 633 <-> IBM-AT	programming	
Order number	657.151.03	
KDT 633 <-> CPU	communication in master mode	
Order number	657.151.01	
KDT 633 <-> V.24-Slave	communication in slave mode	
Occupancy	cf. "3.2.11.2. KDT 633 <-> V.24-Slave ..."	

*1) A data memory in the KDT 633 is only required when in master mode

*2) EPROM: order no. 657.491.04

*3) RAM: order no. 633.180.01

*4) Accu: buffer time ca. 4 weeks, life time ca. 10 years

B. Character sets

B.1. ASCII table

Bit 0 ... 3 (low nibble)	Bit 4 ... 7 (high nibble)							
	0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

Example: the symbol NAK is assigned the hexadecimal value \$15.

The following symbols depend on the selected country code (indicated in hexadecimal values):

23, 24, 40, 5B, 5C, 5E, 60, 7B, 7C, 7E.

The symbols shown in the table correspond to the country code "USA".

Appendix B

B.2. Character set KDT 635, KDT 633

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