



Kuhnke Electronics
Instruction Manual
Kuhnke Dialog Terminals
KDT 623 and KDT 624

E 385 GB

18 August 1995 / 66.590

This manual is primarily intended for the use of the designing engineer, the project planning engineer, and the developing engineer. It does not give any information about delivery possibilities. Data is only given to describe the product and must not be regarded as guaranteed properties in the legal sense. Any claims for damages against us – on whatever legal grounds – are excluded except in instances of deliberate intent or gross negligence on our part. We reserve the rights for errors, omissions or modifications. Reproduction even of extracts only with the editor's express and written prior consent.

Table of contents

1. Introduction	1-1
1.1 Front panel design KDT 623	1-2
1.2 Front panel design KDT 624	1-2
1.3. Differences between KDT 623 and KDT 623 N	1-3
1.4. Differences between KDT 623 N and KDT 624	1-3
1.5. Extent of delivery	1-3
1.6. Function	1-4
2. Safety and Reliability	2-1
2.1. Target group	2-1
2.2. Reliability	2-1
2.3. Notes	2-2
2.3.1. Danger	2-2
2.3.2. Dangers caused by high contact voltage	2-2
2.3.3 Important information / cross reference	2-2
2.4. Safety	2-3
2.4.1. To be observed during project planning and installation	2-3
2.4.2. To be observed during maintenance and servicing	2-4
2.4.3. Measures for the prevention of electrostatic charge	2-4

Table of contents

- 3. Hardware 3-1
 - 3.1. KDT 623 3-1
 - 3.1.1. Display and control elements 3-1
 - 3.1.2. Front view 3-2
 - 3.1.3. Mounting 3-2
 - 3.1.3.1. Front panel cutout 3-2
 - 3.1.3.2. Mounting the KDT 623 3-3
 - 3.2. KDT 624 3-4
 - 3.2.1. Display and control elements 3-4
 - 3.2.2. Front view 3-5
 - 3.2.3. Mounting 3-6
 - 3.2.3.1. Rear view 3-6
 - 3.2.3.2. Front panel cutout and drilling measures (front view) 3-7
 - 3.2.3.3. Mounting 3-7
 - 3.3. Connectors 3-8
 - 3.3.1. Power supply 3-8
 - 3.3.2. Ground connection 3-8
 - 3.3.3. Com1 interface (V.24) for text programming 3-9
 - 3.3.4. Com1 interface (V.24) as printer port 3-9
 - 3.3.5. Com2 interface for controller connection 3-10
 - 3.4. Device connections 3-11
 - 3.4.1. KDT 623/624 <-> PC and KDT 623/624 <-> controller 3-11
 - 3.4.2. KDT 623/624 <-> PC (with KDTCOM) <-> controller 3-12
- 4. Communication with the controller 4-1
 - 4.1. Predefined operand ranges for KDT 623/624 4-2
 - 4.1.1. Operand range for addressing the LEDs of the KDT 624 4-2
 - 4.1.2. Mapping the function keys (F1...F16) of the KDT 624 4-4
 - 4.1.3. Operand range for addressing the LEDs of the KDT 623 4-5
 - 4.1.4. Mapping of the function keys (F1...F12) of the KDT 623 4-7
 - 4.1.5. Mapping of the control word 4-8
 - 4.1.5.1. Monitoring connections 4-8
 - 4.1.5.2. Mapping of the Enter key 4-9
 - 4.1.5.3. Data transmission of an input in process 4-9

4.1.5.4. Mapping of the keys for numbers and special functions	4-10
4.1.6. Selection of the textmessage to be displayed	4-11
4.1.7. Language selection (in KDT 624/623 N)	4-11
4.1.8 Printer connection to COM 1 (on KDT 624/623NEW)	4-12
4.1.9 Character set of the printer	4-13
4.1.10 Activating the printer via the program in the controller	4-13
4.2. Automatic display of system messages	4-14
4.3. Info texts	4-14
4.4. Variables embedded in the textmessage	4-15
4.4.1. Input variables	4-15
4.4.2. Display variables	4-15
5. Programming the KDT 623	5-1
5.1. Installing the KED623 software	5-2
5.2. Starting the KED623 software	5-3
5.3. Menu	5-3
5.4. Project path	5-4
5.5. Display type	5-4
5.6. Text file	5-4
5.7. BeST language 2	5-4
5.8. Character set	5-4
5.9. Program text display	5-5
5.10. Read text display	5-5

Table of contents

5.11. Textmessages 5-6

5.11.1. System settings (in textmessage 0) of the KDT 623 5-7

5.11.2. System settings (message 0) as in example DEMO623 5-9

5.11.3. System settings (in textmessage 0) of the KDT 624 5-10

5.11.4. System settings (message 0) as in example DEMO624 5-12

5.11.5. Edit textmessage 5-13

5.11.6. Types of variables 5-15

5.12. System messages in the text memory 5-22

5.13. Print textmessage 5-24

5.14. Edit character set..... 5-24

5.15. Print character set 5-25

5.16. Create new files (copy)..... 5-25

5.17. Display directory 5-25

5.18. Return to DOS 5-25

A. Technical specifications A-1

B. Character sets B-1

B.1. ASCII table B-1

C. Literature list / Trade marks C-1

C.1. Literature list C-1

C.2. Trade marks C-2

D. KDTCOM - Programming and KDT on the V.24 programming interface D-1

Index Index-1

Sales & Service

1. Introduction

This instruction manual is concerned with the interface connection between dialog terminals KDT 623 and KDT 624 and PLC systems KUAX 657/667/680I via the interface of the programming device. The connection is described as is the writing of text using the KED623 software. In the following, the two devices will be named KDT 623/624 if both are concerned.



The KDT 624 is not available in the Kuhnke design at the moment (colour, keyboard legends, no logo). It has been developed in a customized layout and can only be supplied in this form.

Construction of the device

The KDT 623/624 is basically made up of the following components:

- high-quality aluminium casing
- front panel coated with imprinted polyester foil
- text display with text memory
- operating panel with illuminated push-button indicators
- editor with the additional functions "number conversion", "scaling" and "input limit monitoring"
- IP 65 system of protection (front), achieved by the polyester foil and an allaround-seal

Prinziple of data transmission

Data transmission relies on the programming protocol (KUBES protocol).

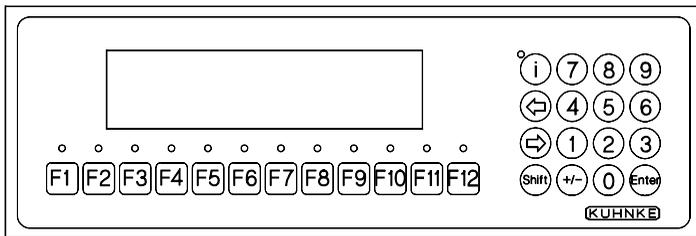
Possible transmission errors are self-acknowledging, i.e. a fault is suppressed by repeating the telegram.

Keyboard and display

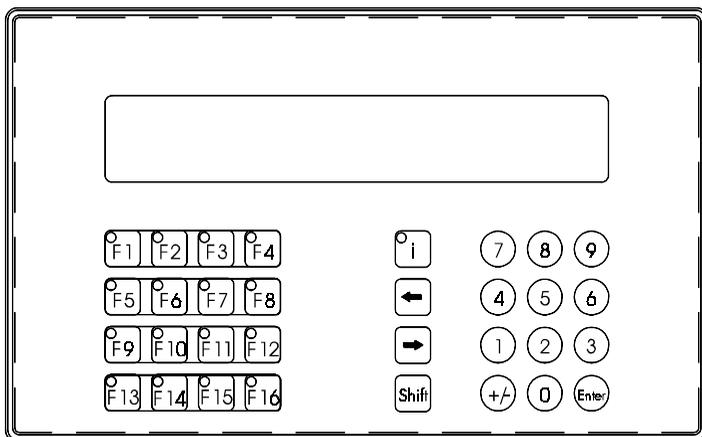
The display is a yellow dot matrix providing 2 lines with 24 characters (KDT 623) or 40 characters (KDT 624) each. The device is equipped with an integrated keyboard which serves as input terminal for commands and data that the user may want to send to the controller.

Introduction

1.1 Front panel design KDT 623



1.2 Front panel design KDT 624



1.3. Differences between KDT 623 and KDT 623 N

The KDT 623 has a 32 KByte text memory, 12 function keys with duo-LED and a 2 line LCD display with 24 characters per line.

This device was delivered up to version number 921908 (the version number appears briefly on the display after switching the device on).

The KDT 623 N is further developed and features a 2 x 32 KByte text memory. This makes "real" on-line switching between languages possible. Considerable software extensions have also been implemented.

The devices KDT 623 and KDT 623 N are upward compatible. To take advantage of the new abilities of the KDT 623 N, you will need the programming software KED 623, version 1.13 or higher.

1.4. Differences between KDT 623 N and KDT 624

The KDT 624 corresponds to the basis of the KDT 623 N. However a 2 line LCD display with 40 characters per line is used. The number of function keys (with red LEDs) has been increased to 16. Due to the larger display the device has different mounting dimensions from the KDT 623 N. The programming software KED 623 (version 1.13 or higher) is used for configuring the KDT 624..

1.5. Extent of delivery

The KDT 623 is delivered complete with 32 KByte EEPROM text memory (KDT 624/623 N with 2 x 32 KByte Flash-EPROM). The connector cables you need are available as accessories (cf. appendix "B. Order specifications").

Introduction

1.6. Function

The KDT 623/624 is an active operating console. Active means that it automatically contacts the controller that it is connected to, reads the assigned operand range and then displays the corresponding textmessages. If the machine needs variables to complete the textmessage, it will read these from the controller (in the case of output variables) or, in the case of input variables, send them there without operating steps being required on the part of the user.

Task separation

Task separation between controller and KDT 623/624:

- Control functions are executed by the controller (that's what it was designed for!)
- text processing, conversion of number formats, input editor: these are tasks for the KDT 623/624

Direct control functions (On/Off) are possible without interrupting an input function.

Textmessages

The KDT 623 displays the textmessage whose number it reads from word operand SBM01.10/11. Changes of the contents of this operand are automatically registered by the device.

If the textmessage to be displayed contains variables, then these are requested from the controller and integrated into the fixed text.

Programming

Textmessages and system settings are programmed via a PC under MS-DOS using the program KED623.

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.

Amongst which are:

- 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,
- stress-test in raised ambient temperatures during 72 hours realtime,
- statistic assessment of the quality of fabrication and of all returned goods for immediate taking of adjustment measures.

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

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:
 - provide sufficient separation of low voltage,
 - apply power packs in accordance with IEC 364-4-41 or CENELEC HD 384.4.41 (VDE 0100, Part 410) respectively.
- 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 switches or other emergency installations have to be realized in accordance with EN 60204/IEC 204 (VDE 0113). They have to 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 (→ 2.3. Notes) which, at relevant places, will make you aware of possible sources of errors.
- 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.

2.4.2. To be observed during maintenance and servicing

- During measuring and checking operations on a controller in a power-up condition, precaution regulation VBG 4.0 has to be observed and §8 (Admissible deviations during working on parts) in particular.
- Repairs must only be executed by the trained Kuhnke personnel (usually in the main factory in Malente). Warranty expires in any 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 special waste.

2.4.3. Measures for the prevention of electrostatic charge

Electrostatic charge is dangerous for components and assembly groups. It is a peculiarity of electrostatics to not destroy the sensitive components but to damage them in a not immediately conceivable way. It is because of this that devices stop functioning after some time of service.

The ESD measures (ESD = electrostatic discharge) executed in the factory are only guaranteed to be effective if they are also regarded by the user (service).

Please note:

- Only store parts in their factory-packing or in an antistatic packing of similar quality.
- Assembly groups must only be touched by persons who are grounded via a wrist bracelet and/or a discharging mat and shoe-grounding strips (⚠ observe protection of people!).
- Only ship assembly groups in their factory-packing or in an antistatic packing of similar quality.



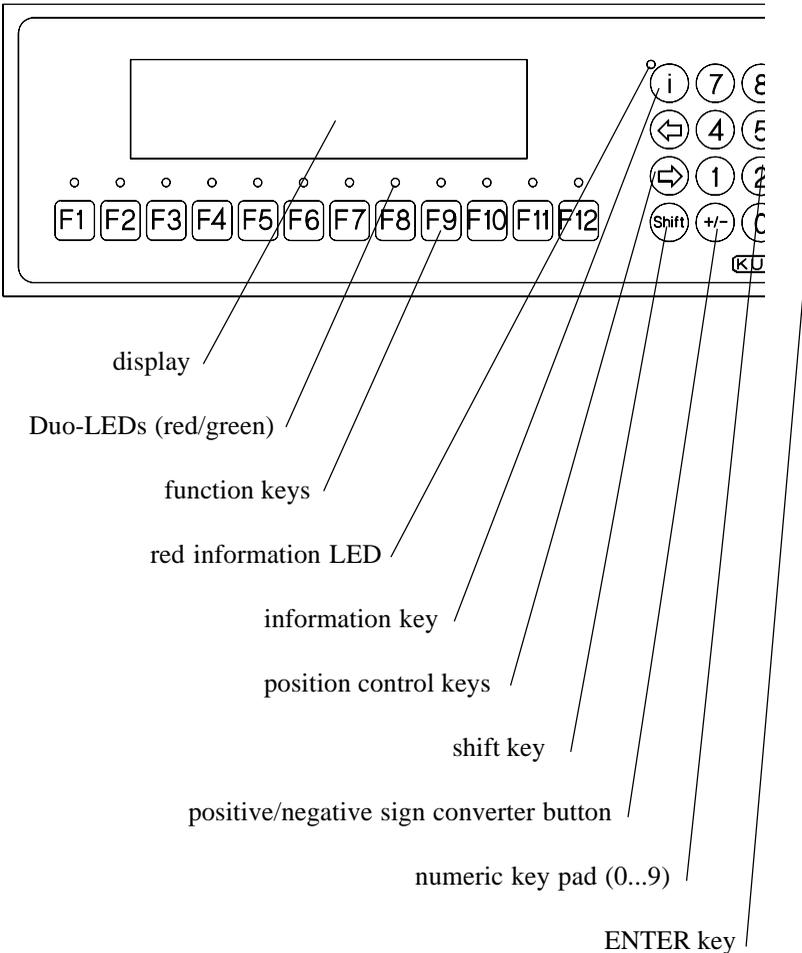
Reference to literature (Fa. 3M Deutschland GmbH, Neuss): Information brochure
Interesting Facts about Electrostatics in Micro-Electronics

3. Hardware

3.1. KDT 623

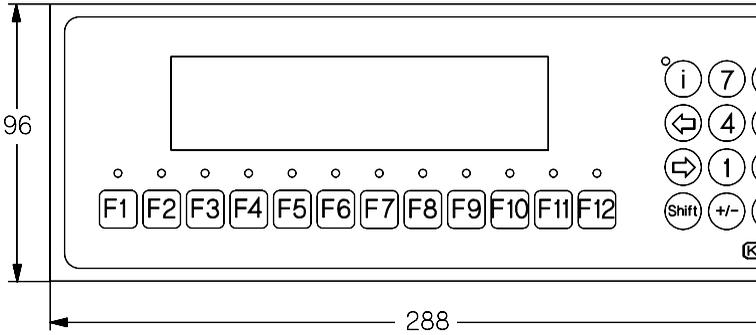
For an overview of the technical data see appendix "A. Technical specifications".

3.1.1. Display and control elements



Hardware

3.1.2. Front view

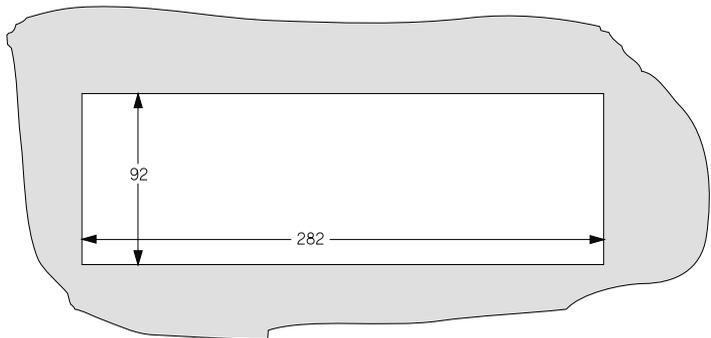


3.1.3. Mounting

You mount the KDT 623 into a front panel (e.g. the door of a switching cabinet).

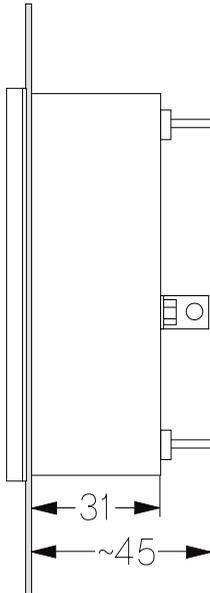
You must cut an opening into the front panel before you can do so:

3.1.3.1. Front panel cutout



3.1.3.2. Mounting the KDT 623

- Remove the sheet metal cover at the back of the KDT 623: this is simply done by unscrewing the 4 nuts and the ground connection.
- Slot the KDT 623 from the front into the opening you cut out before.
- Screw the sheet metal cover back on.

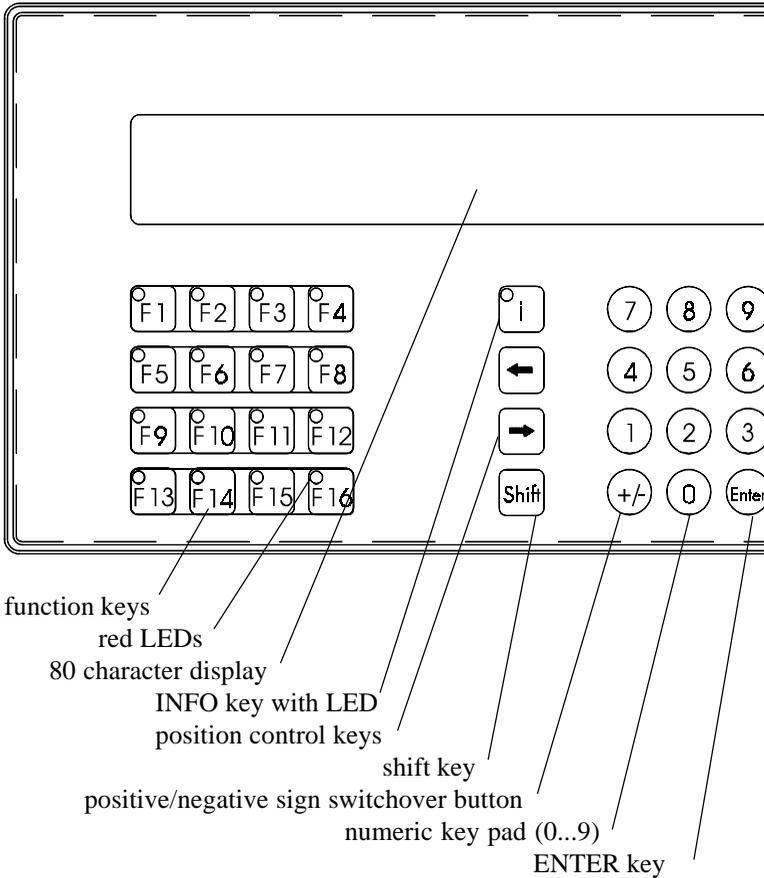


Hardware

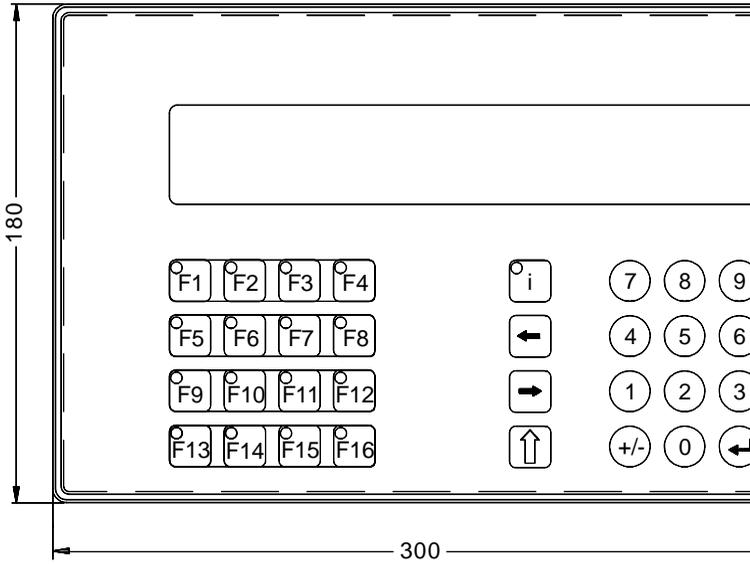
3.2. KDT 624

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

3.2.1. Display and control elements



3.2.2. Front view



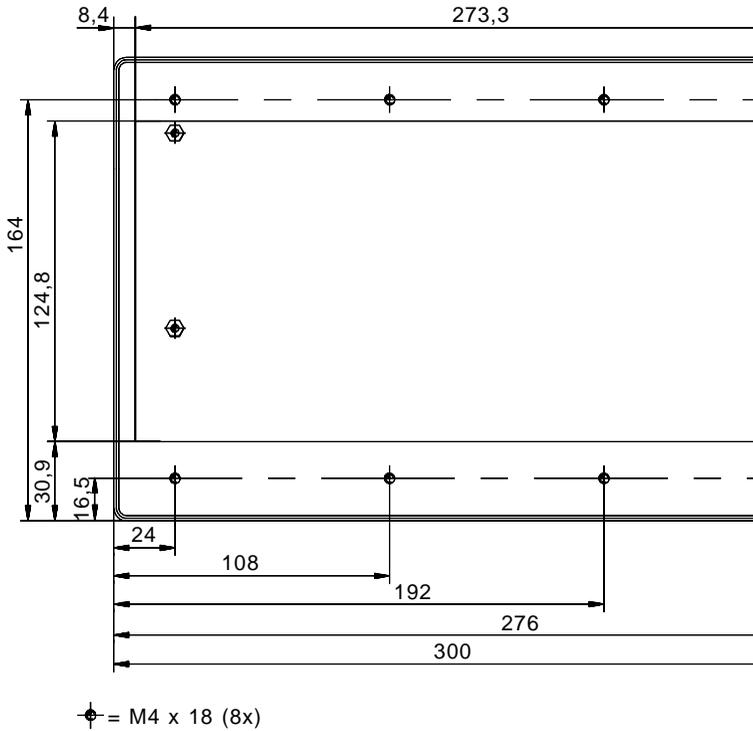
Hardware

3.2.3. Mounting

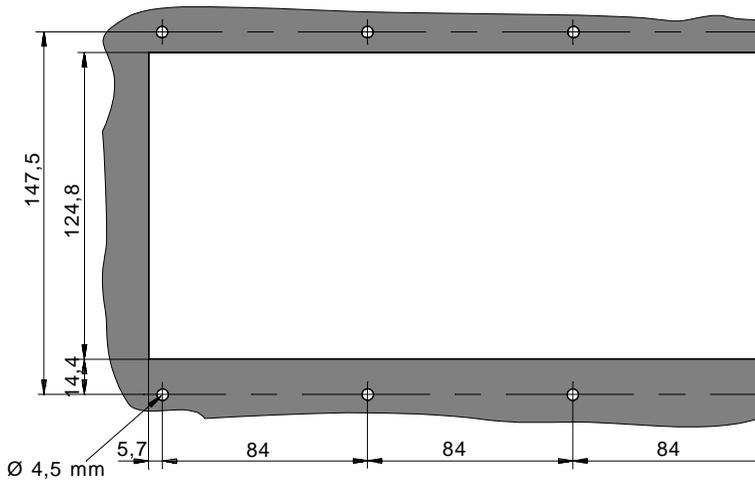
You mount the KDT 623 into a front panel (e.g. the door of a switching cabinet).

You must cut an opening into the front panel before you can do so:

3.2.3.1. Rear view

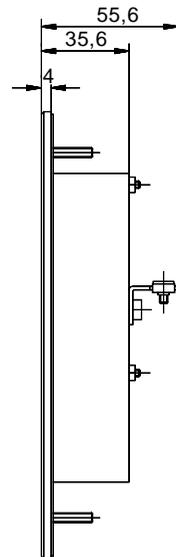


3.2.3.2. Front panel cutout and drilling measures (front view)



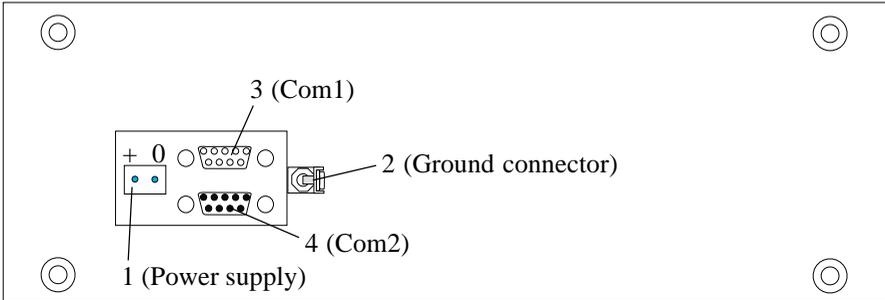
3.2.3.3. Mounting

Slot the terminal from the front into the cutout you made before, making sure to lead the screws through the bores. Use the M4 nuts included in the package to fix the terminal from the back.



3.3. Connectors

All connectors are accessible from the back:



3.3.1. Power supply

The KDT 623/624 is supplied with 24 V DC \pm 20%. The connection is made via a male 2 pin screwed plug connector (1). Power consumption is < 500 mA.



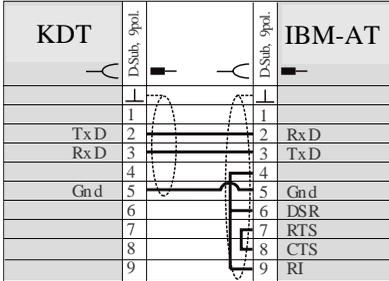
Please avoid disconnecting the device from the connector "0 V" without disconnecting it from the connector "+" at the same time. You may otherwise destroy an internal circuit.

Reason: in this case the device maintains the "0V" connection via the data line if one is connected.

3.3.2. Ground connection

Connect the casing to the local protective ground via the ground connector (2).

3.3.3. Com1 interface (V.24) for text programming

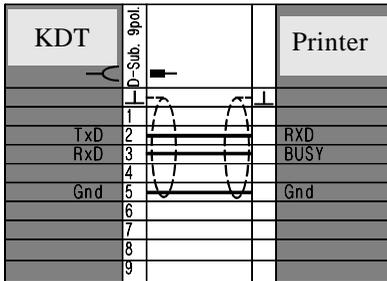


Female 9pin Sub-D connector (3) for PC connection. This interface is used for transmitting the texts into the KDT 623/624.

Pin wiring and connector cable to a PC (AT).

Order number (cable): 623.151.00

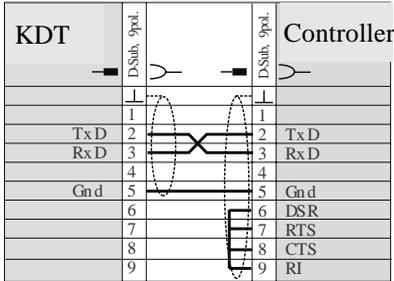
3.3.4. Com1 interface (V.24) as printer port



Female 9pin Sub-D connector (3) for the connection of a serial printer for message reports (for more information see ch. 4.1.8).

Hardware

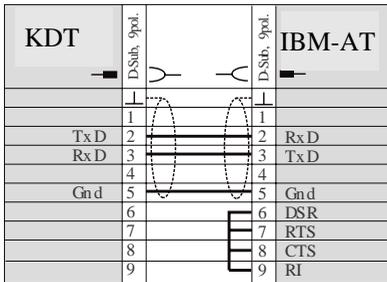
3.3.5. Com2 interface for controller connection



Male 9pin Sub-D connector (4) for controller connection. This interface is used for man-machine communication.

Pin wiring and connector cable to the controller (programmin interface).

Order number (cable): 623.151.01



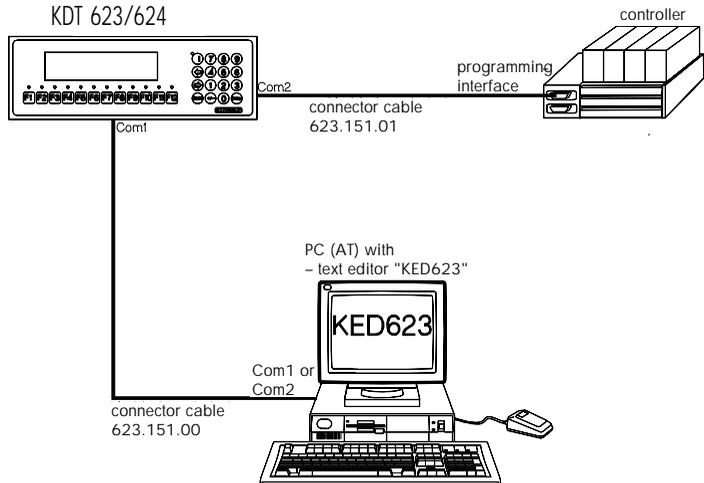
Pin wiring and connection to a PC (AT).

This cable is always used when you also want to connect a PC (AT) to the controller while programming or testing the user program under KUBES. In this case, the program KDTCOM (see appendix "D. KDTCOM") must also be installed on the PC.

Order number (cable): 623.151.02

3.4. Device connections

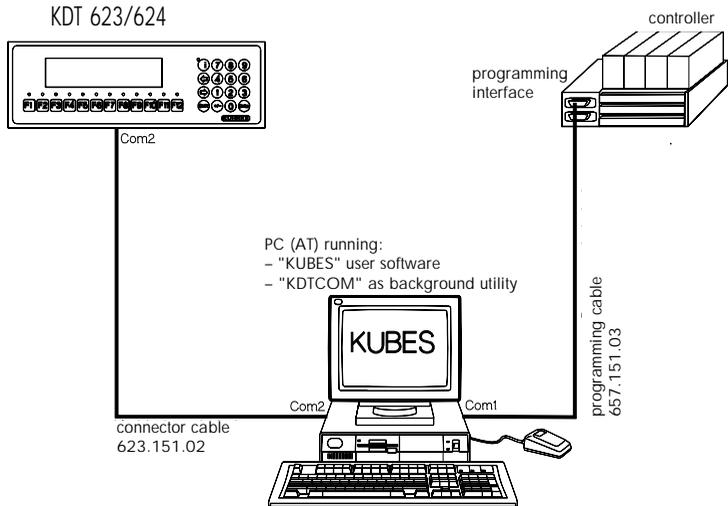
3.4.1. KDT 623/624 <-> PC and KDT 623/624 <-> controller



- The KDT is connected to the PC for programming texts.
- The connection to the controller is used for communication between dialog terminal and controller.

Hardware

3.4.2. KDT 623/624 <-> PC (with KDTCOM) <-> controller

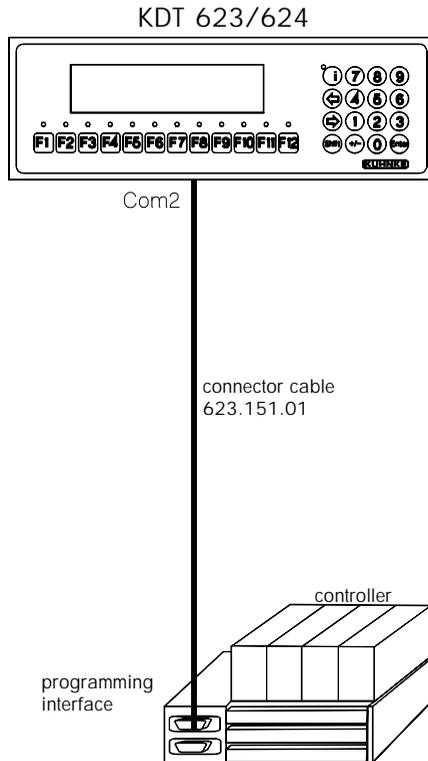


- The program KDTCOM (see appendix D) runs as a background utility on the PC.
- KUBES is the active software application. Like this, KDT and KUBES can communicate with the controller simultaneously (programming of texts with KED623 is not possible).

4. Communication with the controller

The KDT 623/624 can communicate with all programmable logic controllers by Kuhnke which are programmed with KUBES, the Kuhnke user software. These are: KUAX 657, 657P, 667, 680I, 680L.

Using the KUBES protocol, communication is effected via the programming interface of the controller.



Advantages:

no additional hardware or specific interface driver are needed, and the only effort to be made in the user program of the controller is to use the predefined operand ranges. There are V24 modules running the Kubes protocol available for test and startup operations of all controllers with the exception of the KUAX 667).

4.1. Predefined operand ranges for KDT 623/624



KDT 623 and controller communicate via predefined operand ranges in the controller. Please take this fact into consideration for your project planning.

4.1.1. Operand range for addressing the LEDs of the KDT 624

The 16 function keys of the KDT 624 are equipped with LEDs. Each of these LEDs is assigned bits in the following operands which are used by the controller for switching it.



An LED can only be switched by the controller if it is set to "external" addressing (see ch. "5.11.3. System settings *Ta-LED...")

LEDs above the function keys of the KDT 624

LED Key:	F16	F15	F14	F13	F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
Bit:	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand:	SBM01.05								SBM01.04							

Flash status of the LEDs above the function keys of the KDT 624

LED Key:	F16	F15	F14	F13	F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
Bit:	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand:	SBM01.09								SBM01.08							

Beispiel:

Die LED no. 1 is to be switched:

- input I00.00: 0 = red light off, 1 = red light on
- input I00.01: 0 = constant light, 1 = flashlight

;LED 1 switchover red on/off

```

        L    I00.00                ;red LEDs
        JPC  ON                    ;LED 1 off

        L    SBM01.04              ;red LEDs
        A    %1111_1110            ;LED 1 off
        =    SBM01.04
        JP   END                    ;jump to END

ON      L    SBM01.04              ;red LEDs
        O    %0000_0001            ;LED 1 red on
        =    SBM01.04

;switch flashlight LED 1 on/off

        L    I00.01                ;flash
        JPCN FL_OFF

FL_ON   L    SBM01.08              ;flash status
        O    %0000_0001            ;LED 1 flashing
        =    SBM01.08
        JP   END

FL_OFF  L    SBM01.08              ;flash status
        A    %1111_1110            ;LED 1 flash off
        =    SBM01.08

END     NOP
        ...
    
```

4.1.2. Mapping the function keys (F1...F16) of the KDT 624

Inputs via the function keys of the KDT 624 are written into predefined operands of the controller.
 Each bit of operands SBM00.00 and SBM00.01 is assigned to one function key:

Key:	F16	F15	F14	F13	F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
Bit:	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand	SBM00.01								SBM00.00							

Each keystroke is transmitted to the controller. The function of every key can be set (see ch. "5.11.3. System settings..., *Ta-Mode..."):

- key function "non-locking", or "monostable"
 the assigned bit is set to 1 by the rising edge of the key impulse and cleared again when the key is released.
- key function "locking", or "bistable"
 the assigned bit is set to 1 at the first stroke of the key and cleared again at the next etc.



Pressing a function key is reported to the controller even if there is still an unfinished input operation in process (see ch. "4.4.1. Input variables").

4.1.3. Operand range for addressing the LEDs of the KDT 623

There are 12 light emitting diodes above the 12 function keys of the KDT 623. These are so-called duo-LEDs as they can light up in two different colours, green and red.

Each of these LEDs is assigned bits in the following operands which are used by the controller for switching it.



An LED can only be switched by the controller if it is set to "external" addressing (see ch. "5.11.1. System settings..., *Ta-LED...")

Red LEDs above the function keys

LED Key:					F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
Bit:	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand	SBM01.05								SBM01.04							

Green LEDs above the function keys

LED Key:					F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
Bit:	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand	SBM01.07								SBM01.06							

Flash status of the LEDs above the function keys

LED Key:					F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
Bit:	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand:	SBM01.09								SBM01.08							



If the bits for both red and green are activated, the red LED will light up.

Software

Example: LED No. 1 is to be switched:

Input I00.00: 0 = red on, 1 = green on

Input I00.01: 0 = constant light, 1 = flashlight

```
;LED 1 switchover red/green
      L    I00.00          ;colour
      JPC  GREEN

RED   L    SBM01.06       ;green LEDs
      A    %1111_1110    ;LED1 green off
      =    SBM01.06
      L    SBM01.04       ;red LEDs
      O    %0000_0001    ;LED 1 red on
      =    SBM01.04
      JP   JMP_00        ;jump

GREEN L    SBM01.04       ;red LEDs
      A    %1111_1110    ;LED 1 red off
      =    SBM01.04
      L    SBM01.06       ;green LEDs
      O    %0000_0001    ;LED 1 green on
      =    SBM01.06

;switch flashlight LED 1 on/off
JMP_00 L    I00.01       ;flash
      JPCN FL_OFF

FL_ON  L    SBM01.08     ;flash status
      O    %0000_0001    ;LED 1 flashing
      =    SBM01.08
      JP   END_00

FL_OFF L    SBM01.08     ;flash status
      A    %1111_1110    ;LED 1 flash off
      =    SBM01.08
      ...
```

4.1.4. Mapping of the function keys (F1...F12) of the KDT 623

Inputs via the function keys of the KDT 623 are written into predefined operands of the controller.

Each function key is assigned to one bit of operands SBM00.00 and SBM00.01:

Key					F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
Bit:	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand	SBM00.01								SBM00.00							

Each keystroke is transmitted to the controller. The function of every key can be set (see ch. "5.11.1. System settings..., *Ta-Mode..."):

- key function "non-locking", or "monostable"
the assigned bit is set to 1 by the rising edge of the key impulse and cleared again when the key is released.
- key function "locking", or "bistable"
the assigned bit is set to 1 at the first stroke of the key and cleared again at the next etc.



Pressing a function key is reported to the controller even if there is still an unfinished input operation in process (see ch. "4.4.1. Input variables").

Software

4.1.5. Mapping of the control word

The control word serves several purposes:

								1	CR	X	SFT	D	C	B	A	
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Operand	SBM00.03								SBM00.02							
	Reserve															
	"Sign of life". Is set cyclically by the KDT															
	<Enter> key															
	Data transmission of an input in process															
	<Shift> key															
	Numbers and special functions keys, encoded acc. to table "4.1.5.4. Mapping of the keys for numbers and special functions "															

4.1.5.1. Monitoring connections

Bit 7 in SBM00.02 is set and reset cyclically by the KDT 623/624. Like this the user program in the controller can check whether the KDT 623/624 is still connected and operating.

Example:

Byte marker BMxx.xx is to be increased (incremented) by 1 each time that bit 7 is set:

```

L      SBM00.02          ;load control byte
A      %1000_0000        ;mask bit 7
JP=    JMP_01            ;jump if "0"

INC    BMxx.xx           ;KDT 623 ok
L      SBM00.02          ;load control byte
A      %0111_1111        ;mask bit 7
=      SBM00.02          ;clear bit 7
JMP_01  ...

```

The maximum time between two edges is 3 seconds.

4.1.5.2. Mapping of the Enter key

Bit 6 in SBM00.02 is set by the KDT 623/624 when the "Enter" key is pressed.

4.1.5.3. Data transmission of an input in process

Bit 5 in SBM00.02 is set by the KDT 623/624 if an input is terminated by the "Enter" key and if all input variables in the textmessage are within the limits determined by the program. The bit is set for at least 1 cycle so that the input is sure to be analysed by the user program. It is cleared after all input variables have been transferred to the appropriate byte markers.



As long as bit 5 is set (1) the corresponding variables should not be evaluated. Otherwise it could happen that a wrong value is registered as the bytes of a variable are transferred serially.

Example:

As long as bit 5 is set (1) the evaluation is skipped:

```

L      SBM00.02      ;load control byte
A      %0010_0000    ;mask bit 5
CMP    0
JP<>  JMP_02        ;jump if "1"

LD     BRxx.xx       ;variable word x
...
; evaluation

JMP_02 ...

```

4.1.5.4. Mapping of the keys for numbers and special functions

The number key (0...9) or special function key (i, +/-, ->, <-) that was pressed last is mapped on bits 0...3 in SBM00.02.

Operand SBM00.02						
Hex.	Dec.	Binary (Bit)				Key
		3	2	1	0	
F	15	1	1	1	1	none
E	14	1	1	1	0	unused
D	13	1	1	0	1	i (Info key)
C	12	1	1	0	0	+/- (sign key)
B	11	1	0	1	1	-> (input position right)
A	10	1	0	1	0	<- (input position left)
9	9	1	0	0	1	9
8	8	1	0	0	0	8
7	7	0	1	1	1	7
6	6	0	1	1	0	6
5	5	0	1	0	1	5
4	4	0	1	0	0	4
3	3	0	0	1	1	3
2	2	0	0	1	0	2
1	1	0	0	0	1	1
0	0	0	0	0	0	0

4.1.6. Selection of the textmessage to be displayed

The textmessages to be displayed are stored in the KDT 623/624 and sorted by numbers (0...max. 999) (see ch. "5.11.3. Editing textmessages"). If a text is to be displayed, the user program has to write its corresponding number into the following operands:

High Byte	Low Byte
SBM01.11	SBM01.10

Example:

```
LD      5           ;display textmessage
=D     SBM01.10   ;no. 5 on the KDT 624
```

The KDT 623/624 permanently reads the contents of these operands so that it instantly displays the required text.

4.1.7. Language selection (in KDT 624/623 N)

You can store two text files in the KDT 624/623NEW. After power-up, text file 1 is the active text file by default. There is a memory capacity of 2 x 32 KByte available for message texts and character set. Select the second file in the KDT by switching the operand.

High Byte	Low Byte
SBM01.15	SBM01.14

Only bit 0 is analysed.

Example:

```
L      1           ; selecting the second text file
=     SBM01.14 ;
```

or

```
CLR   SBM01.14   ;selecting the first text file
```

4.1.8 Printer connection to COM 1 (on KDT 624/623NEW)

You can use the COM 1 port of the KDT to output messages to a serial printer (RS232, 9600,8,N,1).

All messages that are displayed can also be independently transmitted to the printer.

The texts are formatted to fit into the same line width as they appear on the screen (24 or 40 characters per line). To activate this function you must add the entry (*Printer). to the system setting of the KDT:

Should it become necessary for the printer spooler to include certain control characters into the text (form feed, bold print etc.) you have the following possibility:



The "#" character is interpreted as a control character by the printer output channel.

representation of character "#"
#n disables the line feed
#xx xx= two-digit representation of values (e.g. #1B for ESC)

Example:

@UNS 17!	declaration of variables
#1BA12	initialising the printer (ESC A 12)
#0F	bold print on (depending on printer)
Demo - Printout#0E	text and bold print off
test#n	text and no LF
speed__ mph	text with placeholder for variable

You will receive the following printout:

Demo - Printout
test speed 78mph



The printer should be capable of storing at least 2 characters after the handshake signal has been disabled.

4.1.9 Character set of the printer

The contents of the text memory are put out to the printer without any changes. This means that the default setting (*CPM or *IBM) is only valid for the KDT.

If you are working with text variables please remember that only characters in the range between 20h and 9Fh are permissible.

You can use the characters between 20h and 1Fh as reference characters for the second character set. All user-defined characters are printed in the IBM graphics mode if this mode is supported by the connected printer.

4.1.10 Activating the printer via the program in the controller

The text number of the textmessage to be printed is entered into operand

High Byte	Low Byte
SBM01.13	SBM01.12

Only 10 bits are required for the selection of the text number (999 texts max.)

Bit 15 (bit 7 in SBM01.13) is used as message bit between controller and KDT.

The KDT resets bit 15 when the printout is complete.

Programming sequence:

The user writes the text number of the message to be printed into SBM01.12 and SBM01.13 and then sets bit 15 to "1".

You must only start a new printout after this bit has been reset to "0" by the KDT.

Software

Example:

```
*** Is the printer free ? ****  
  
L      SBM01.13      ;  
A      %1000_0000    ;mask high bit  
JPC    NO             ; printer busy  
  
*** Print message ! ****  
  
LD     5              ;message #5  
=D     SBM01.12      ;is to be printed  
L      SBM01.13      ;  
O      %1000_0000    ;set highest bit  
=      SBM01.13      ;printer go  
  
NO    NOP
```

4.2. Automatic display of system messages

The system messages start with number 1000 upwards in the text memory (see ch. "5.12. System messages in the text memory"). You can use the KED623 software to edit these messages. They are, however, called up automatically when the event (e.g. "no connection to the controller") occurs.

4.3. Info texts

Every textmessage can be assigned an additional info text (see ch. "5.11.5. Editing textmessages"). These texts may contain e.g. instructions for use or further explanations. If a text message is assigned such an info text, the LED in the "i" key will light up when the message is displayed. Press the "i" key to display the info text. The text disappears again when you release the "i" key.



Pressing the "i" key does not interrupt an input operation in process.

4.4. Variables embedded in the textmessage

In up to 896 variable words (of 16 bit or 2 byte each), variable data can be sent from the controller to the display or they can be transferred as input variables from the KDT 623/624 to the controller (see ch. "5.11.5 Editing text messages"). They are numbered consecutively from 0...895:

Variable words			Operands		
0	to	127	BR00.00	to	BR15.15
128	to	255	BC00.00	to	BC15.15
256	to	383	SBC00.00	to	SB15.15
384	to	511	BD00.00	to	BD15.15
512	to	639	SBD00.00	to	SBD15.15
640	to	767	LBM00.00	to	LBM15.15
768	to	895	FBM00.00	to	FBM15.15

Examples: Variable word Operands
 0 BR00.00 (LB), BR00.01 (HB)
 255 BC15.14 (LB), BC15.15 (HB)

4.4.1. Input variables

Once a textmessage containing input variables has been called up, the corresponding input variables are permanently read in from the controller and displayed. You can use the input editor and the numeric keypad of the KDT 623/624 to modify the input variables. After pressing the <Enter> key to confirm the entry, the entered values are checked for a possible violation of the set input limits. If no error occurs, the values are transmitted to the controller and written into the assigned operands.

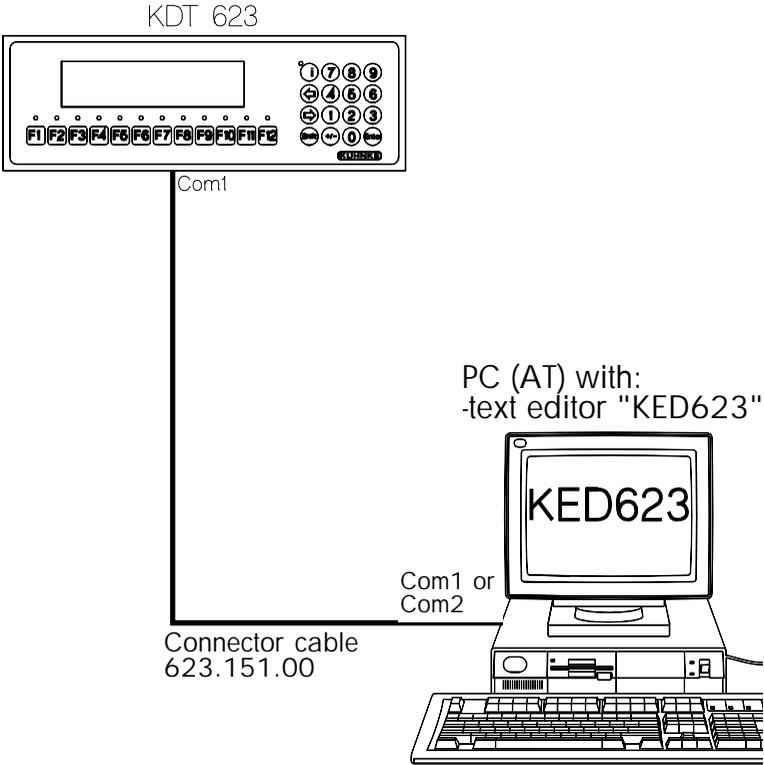
4.4.2. Display variables

They are permanently read in from the controller and displayed together with the corresponding textmessage. They cannot be altered from within the KDT 623/624.

Software

5. Programming the KDT 623

To program the KDT 623/624 you need a PC and the text editor software KED623:



To take advantage of all the possibilities, we recommend using version 1.13 or higher of the programming software KED623 if you are working with a KDT 624 or a KDT 623N.

Software

5.1. Installing the KED623 software

KED623 is delivered on a disk which contains all necessary files including the installation program.

To install the program proceed as follows:

- make a working copy of the software by copying the contents of the original disk to another disk; store the original disk at a safe place
- insert the disk with the working copy (no write protection) into drive A (or B)
- change to drive A (or B):
via your keyboard enter: A:<Enter> (or B:<Enter>)
- call up the installation program:
via your keyboard enter: INSTALL<Enter>

Installation is done in constant dialog with the user who simply has to answer the questions correctly. The program then copies all necessary files to the hard disk and configures the software.

Monitor type:

The type of monitor (graphics adapter) used is asked for. Using the arrow keys (→ / ←), you can choose between "EGA/VGA", "CGA" and "Other" (other screen type).

If your choice is "Other", we recommend selecting "CPM" as the first internal character set when setting the system parameters (see ch. "5.11. System settings..."). In this case, however, you cannot enter the umlauts (modified vowels), via the keys reserved for them but according to the following list of substituting characters:

Umlaut	substituting character
Ä	[
Ö	\
Ü	^
ä	{
ö	|
ü	~

To change the configuration:

Should you wish to change the interface or the colour settings at any later date, you will have to repeat installation (from diskette).

5.2. Starting the KED623 software

- Change to the program working directory (the directory to which the program was copied):
 CD \KDT623<Enter>
 (or to the directory which you specified during installation)
- To start the program enter:
 KDT<Enter>
 and the following menu will appear:

5.3. Menu

- see ch. 5.4.
- see ch. 5.5.
- see ch. 5.6.
- see ch. 5.7.

- see ch. 5.8.

- see ch. 5.9.
- see ch. 5.10.
- see ch. 5.11.
- see ch. 5.13.
- see ch. 5.14.
- see ch. 5.15.
- see ch. 5.16.
- see ch. 5.17.
- see ch. 5.18.

```

Text creation for KUHNE KDTs v 1.10

Project path:      PROJ
Display type:     KDT 624      bilingual <- ->
Text file:        DEMO624
BeST language 2:

Character set:     DEMO

Program TEXTDISPLAY
Read TEXTDISPLAY
Edit textmessage
Print textmessage
Edit character set
Print character set
Create new files
Display directory
Return to DOS
  
```

Free Main Memory 475080 Bytes

COM1:

(c) KUHNE GmbH

Software

5.4. Project path

The path indicated here is where the text file is or will be stored.

5.5. Display type

Use this option to set the display type. Make your selection with the arrow keys (← / →). At present your options are KDT 623, KDT 623 N or KDT 624.

Like the KDT 624, the KDT 623 N too has a text memory of a capacity of 2 x 32 KByte. As opposed to the older model, KDT 623, you now have the option to store 2 message text files.

5.6. Text file

Use this option to specify the name of the file in which the texts you create will be stored on hard disk (<project name>.TXT).

5.7. BeST language 2

Use this option to specify the name of the file in which the second text will be stored on hard disk (<project name>.TXT). (Only for KDT 624/ 623 N).

5.8. Character set

KED623 allows the user to generate his own character set (see ch. "5.14. Edit character set"). This character set is stored under the name that you enter here; the program will automatically add the extension ".PIX".

5.9. Program text display

Prerequisites:

- PC and KDT 623/624 are connected via the serial interface (see illustration on page 5-1)
- The PC contains a textmessage (<file name>.TXT).

The following data can be transferred to the KDT 623/624:

- Text
 - textmessages 1...n (file2 <file name2>.TXT)
 - textmessages 1...n (file2 <file name2>.TXT)
- System settings
 - textmessage no. 0 (in file <file name1>.TXT)
- Character generator
 - additional character set (file <character set name>.PIX), generated by the user (see ch. "5.14. Editing the character set")

5.10. Read text display

Prerequisites:

- PC and KDT 623/624 are connected via the serial interface (see illustration on page 5-1)
- There are data stored in the KDT 623//624

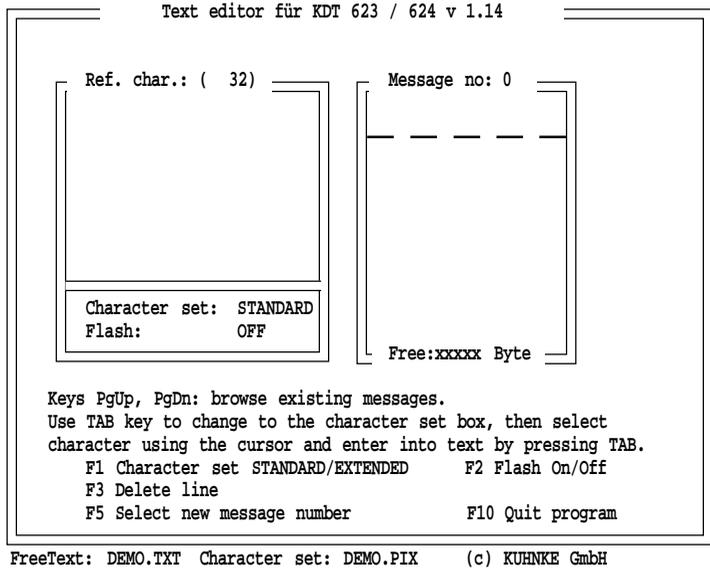
The stored textmessages (text files) and the additional character set (pixel file) can be read by the KDT 623/624 and then written into the following files on the PC:

<file name>.TXT and <character set name>.PIX.

If these files exist already they will be overwritten after confirmation.

5.11. Textmessages

Calls up the editor in which the textmessages are written:



The textmessage editor basically consists of 2 windows:

- the text editor on the right
this is where, above the broken line, the messages are edited. The messages are numbered from 0 on upwards. The number of the message currently in the editor is indicated at the top of the window frame. Use the "page up" (PgDn ↓) and "page down" (PgDn ↑) keys to browse backwards and forwards through the existing messages.
- the reference character window on the left
here the additional characters appear, if any exist. You generate these in the character set editor (see ch. "5.14. Editing the character set").
Use the tabulator key (TAB) to move to this field. Then use the arrow keys (←, ↑, →, ↓) to select the desired character. Press the TAB key again to insert the selected character into the textmessage (on the right).

5.11.1. System settings (in textmessage 0) of the KDT 623

Textmessage 0 represents a special type of textmessage. It is used for entering the system settings before the actual textmessage:

- ***Binary**

The binary system is used to select the textmessages alternatively:

***BCD**

The BCD system is used to select the textmessages. This reduces the possible number of textmessages to 400.

- ***IBM**

The first internal character set loaded is generated in accordance with the ASCII table used in IBM PCs.

alternatively:

***CPM**

The first internal character set loaded is generated in accordance with the ASCII table used in CPM systems. This means that you have to press alternative keys to enter the umlauts (modified vowels) (see table in ch. "5.1. Installing the KED623 software").

- ***Brightness: xx%**

Adjusts the brightness of the display. Choose one of the following options:

10, 20, 30, 40, 50,80, 100%.

- ***Scroll time: x,ys**

If a textmessage is too long to fit into the display at once, the display scrolls through the text line by line. The scroll time indicates the pulse in which this is done. You may enter anything in the range of 0.1...6.3s.

- ***Flash-on: x,ys**

Flash-on duration. Valid entries are 0.1...6.3s.

- ***Flash-off: x,ys**

Flash-off duration. Valid entries are 0.1...6.3s.

- ***Kb-mode: MBBBMMMM NLNL**

The keyboard mode of the function keys can be defined for each key separately:

M = monostable, equal to N = non-locking

B = bistable, equal to L = locking

The sequence from left to right corresponds to the position of function keys F1...12.

- ***Kb-LED: EIIIIIEE IEIE**

The LEDs above the function keys can be activated either internally (LED lights up upon keystroke) or externally (by the controller: see ch. "4.1.3. Operand range for addressing the LEDs of the KDT 623"):

I = Internal (recommended for keyboard modes "B" and "N")

E = External (see ch. "4.1.3. Operand range for addressing the LEDs of the KDT 623")

The sequence from left to right corresponds to the position of the LEDs above function keys F1...12.

- ***Kb-colour: RGRRRRG GRGG**

The LEDs above the function keys can light up green or red (only if *Kb-LED=I):

G = green

R = red

The sequence from left to right corresponds to the position of the LEDs above function keys F1...12.

- ***Kb-flash: ONNNNNNO OON**

A flash matrix can be defined for the activated LEDs. The setting that you make here is "Or"-connected to the flash bit in the controller (see ch. "4.1.3. Operand range for addressing the LEDs of the KDT 623").

O (or 1) = Flash On

N (or 0) = Flash Off

The sequence from left to right corresponds to the position of the LEDs above function keys F1...12.



It is important to enter the system settings in the above sequence. The asterisk * must be the leftmost character or otherwise the system setting will not be recognised as such but displayed as textmessage.

To take over the system settings from the demo project

A demo project called "DEMO_623" is installed together with the KED623 software. To save typing time we recommend copying the textmessages into your file <project>.TXT when starting a new project (see ch. "5.16. Creating new files"). Then this file will contain all system settings which you will only need to adjust to your specific needs.

5.11.2. System settings (message 0) as in example DEMO623

```

Text editor for KDT 623 / 624 v 1.14

Ref. char.: ( 32)
  03

Character set: STANDARD
Flash: OFF

Message no: 0
*Binary
*IEM character set
*Brightness: 20%
*Scroll time: 2.8s
*Flash on: 0.4s
*Flash off: 0.3s
*Kb-mode: BBBBMMMM BBBB
*Kb-LED: IIIIIIII IIII
*Kb-colour:GGGGGGGG GGGG
*Kb-flash:NNNNOOOO NNNN
*
* KUHNKE KDT 623 * with
text memory and editor
@
The red LED above the i
Free:xxxxx byte

Keys PgUp, PgDn: browse existing messages.
Use TAB key to change to the character set box, then select
character using the cursor and enter into text by pressing TAB.
F1 Character set STANDARD/EXTENDED      F2 Flash On/Off
F3 Delete line
F5 Select new message number            F10 Quit program

FreeText: DEMO.TXT      Character set: DEMO.PIX      (c) KUHNKE GmbH

```

Legend:

- The left window (Reference character) displays 2 additional characters. They have been defined in the character set "DEMO.PIX" (see bottom line).
- The right window contains the system settings at the top. They start with an asterisk at the leftmost entry position.
- Below the system settings, the message:


```
"* KUHNKE KDT 623 * with text memory and editor"
```

 is shown. Upon call-up by the controller, this message is displayed on the KDT 623 (The message starts with a space. The message would not be recognized as such if the asterisk were positioned leftmost.)
- Below the textmessage, there is an info text, defined as such by the commercial a, "@", in the line above it. On the KDT 623, this info text can be displayed by pressing the "i" key while the corresponding LED is lit up.

5.11.3. System settings (in textmessage 0) of the KDT 624

Textmessage 0 represents a special type of textmessage. It is used for entering the system settings before the actual textmessage:

- ***Binary**

The binary system is used to select the textmessages alternatively:

***BCD**

The BCD system is used to select the textmessages. This reduces the possible number of textmessages to 400.

- ***IBM**

The first internal character set loaded is generated in accordance with the ASCII table used in IBM PCs.

alternatively:

***CPM**

The first internal character set loaded is generated in accordance with the ASCII table used in CPM systems. This means that you have to press alternative keys to enter the umlauts (modified vowels) (see table in ch. "5.1. Installing the KED623 software").

- ***Brightness: xx%**

Adjusts the brightness of the display. Choose one of the following options:

10, 20, 30, 40, 50, 80, 100%.

- ***Scroll time: x,ys**

If a textmessage is too long to fit into the display at once, the display scrolls through the text line by line. The scroll time indicates the pulse in which this is done. You may enter anything in the range of 0.1...6.3s.

- ***Flash-on: x,ys**

Flash-on duration. Valid entries are 0.1...6.3s.

- ***Flash-off: x,ys**

Flash-off duration. Valid entries are 0.1...6.3s.

- ***Kb-mode1: MBBBMMMM**

- ***Kb-mode2: NLNLMMMM**

The keyboard mode of the function keys can be defined for each key separately:

M = monostable, equal to N = non-locking

B = bistable, equal to L = locking

(continued on next page)

The sequence from left to right corresponds to the position of function keys F1...F8 for Kb-mode 1 and F9...F16 for Kb-mode2.

- ***Kb-LED: EIIIIIEE IEIE**

The LEDs above the function keys can be activated either internally (LED lights up upon keystroke) or externally (by the controller: see ch. "4.1.1. Operand range for addressing the LEDs of the KDT 624"):

I = Internal (recommended for keyboard modes "B" and "N")

E = External (see ch. "4.1.1. Operand range for addressing the LEDs of the KDT 624")

The sequence from left to right corresponds to the position of function keys F1...F8 for Kb-LED1 and F9...F16 for Kb-LED2.

- ***Kb-flash1: ONNNNNNO OON**

- ***Kb-flash2: ONNNNNNO OON**

A flash matrix can be defined for the activated LEDs. The setting that you make here is "Or"-connected to the flash bit in the controller (see ch. "4.1.1. Operand range for addressing the LEDs of the KDT 624").

O (or 1) = Flash On

N (or 0) = Flash Off (no flash)

The sequence from left to right corresponds to the position of function keys F1...F8 for Kb-flash1 and F9...F16 for Kb-flash2.



It is important to enter the system settings in the above sequence. The asterisk * must be the leftmost character or otherwise the system setting will not be recognised as such but displayed as textmessage.

To take over the system settings from the demo project

A demo project called "DEMO_624" is installed together with the KED623 software. To save typing time we recommend copying the textmessages into your file <text file>.TXT when starting a new project (see ch. "5.16. Creating new files"). Then this file will contain all system settings which you will only need to adjust to your specific needs.

5.11.4. System settings (message 0) as in example DEMO624

```
Text editor for KDT 623 / 624 v 1.14

Ref. char.: ( 32)
  03

Message no: 0
*Binary
*IEM character set
*Brightness: 20%
*Scroll time: 2.8s
*Flash on: 0.4s
*Flash off: 0.3s
*Kb-model: BBBEMMM
*Kb-LED1: IIIIIIII
*Kb-flash1: NNNNOOOO
*Kb-mode2: BBBEMMM
*Kb-LED2: IIIIIIII
*Kb-flash2: NNNNOOOO
*
* KUHNKE KDT 623 * with
text memory and editor
Free:xxxxx byte

Character set: STANDARD
Flash: OFF

Keys PgUp, PgDn: browse existing messages.
Use TAB key to change to the character set box, then select
character using the cursor and enter into text by pressing TAB.
F1 Character set STANDARD/EXTENDED      F2 Flash On/Off
F3 Delete line
F5 Select new message number            F10 Quit program

FreeText: DEMO.TXT      Character set: DEMO.PIX      (c) KUHNKE GmbH
```

Legend:

- The left window (Reference character) displays 2 additional characters. They have been defined in the character set "DEMO.PIX" (see bottom line).
- The right window contains the system settings at the top. They start with an asterisk at the leftmost entry position.
- Below the system settings, the message: "* KUHNKE KDT 624 * with text memory and editor" is shown. Upon call-up by the controller, this message is displayed on the KDT 624 (The message starts with a space. The message would not be recognized as such if the asterisk were positioned leftmost.)
- Below the textmessage you can add an info text, defined as such by the commercial a, "@", in the line above it. On the KDT 624, this info text can be displayed by pressing the "i" key while the corresponding LED is lit up.

5.11.5. Edit textmessage

The textmessages are stored sorted by consecutive numbers (0..999). There is no limit to the length of a textmessage but the overall capacity of the text memory is limited to 2 x 32 Kbyte (1 x 32 Kbyte in the KDT 623). If a text is too long to be displayed all at once the display scrolls through it line by line. The pulse of this "scrolling" is set as one of the system settings (see ch.s "5.11.1. and 5.11.3. System settings...") under "Scroll time".

Apart from the actual textmessage, further information can be added to a message:

- Input and output variables

(see ch. "4.4. Variables embedded in the textmessage")

Variables must be declared before the actual textmessage. The declaration must follow the same sequence in which the variables are embedded, by dummies, into the following textmessage. The declaration consists of the character "@", followed by the variable type (see ch. "5.11.6. Types of variables"), a space and the number of the variable.

Display variables: the number of the variable is immediately followed by an exclamation mark.

Example: **@UNS 10!**

Input variables: the number of the variable is followed by a space and the input limits (minimum and maximum values).

Example: **@UNS 11 30 200**



It is mandatory to enter the input limits.

The variables are embedded in the textmessage by dummies. The number of times that the character "_" (Underline) is entered has to correspond to the maximum number of digits that the variable can take on. Decimal digits may be separated by a decimal point.

Example: **The temperature is __. __ °C**

- Info texts

An additional info text can be assigned to a textmessage. If an info text exists for a textmessage, the red LED next to the "i" key will light up when the textmessage is displayed. Press on the "i" key to display the info text.

The info text must be edited after the textmessage. The start of an info text is marked by the "@"-character in the line above it.

Example: @
 The standard value is 50 °C

- RESET of function keys

Up to four switched-on (locking mode) function keys can be deactivated again in combination with textmessages into which input variables are embedded. The function keys are deactivated when all entries have been made correctly and after you have then pressed the <Enter> key.

The numbers of the function keys are entered immediately after the "@" character which marks the beginning of the info text. The numbers of the function keys are separated by space, comma or full stop.

Example: @2,3
 Machine stop until all entries ok

5.11.6. Types of variables

Variables from the connected controller can be included into the textmessages that appear on the display of the KDT 623/624 (see ch. "5.11.5. Editing textmessages").

There are various types of variables which are included in the declaration of the variable (no entry always assumes the default variable type, UNS).

Syntax of variable declarations:

@[tttt] xxx [!] [min] [max] [#]

either
or

tttt: type of variable
xxx: number of the variable word
!: identificat. of a display variable (without leading zeroes)
#: identification of a display variable (with leading zeroes)
min: lower input limit (only for input variables) *)
max: upper input limit (only for input variables) *)

*) Exception: If a display variable is of the text type of variables, the [min] entry is needed for the text offset.

UNS type of variables

- The value of the specified operand is interpreted as a positive number (0...65535).
- Keys 0...9 are considered valid keys by the input editor.
- The valid number of dummies is 1...5.

KF or INT type of variables

- The value of the specified operand is interpreted as KF number (-32767...+32767).
- Keys 0...9 and ± for sign switching are considered valid keys by the input editor.
- The valid number of dummies is 2...6 as the sign also occupies a digit.

BCD type of variables

- The value of the specified operand is interpreted as a 4-digit BCD number (0...9999).
- Keys 0...9 are considered valid keys by the input editor.
- The valid number of dummies is 1...4.
- If the nibbles were assigned values greater than 9 in the controller, these numbers are represented by the letters A...F on the display.

BCDL or LNG type of variables

- The value of the specified operand is interpreted as an 8-digit BCD number (0...99999999).
- Keys 0...9 are considered valid keys by the input editor.
- The valid number of dummies is 5...8.



In the controller, this variable word does not only occupy 2 byte but 4 byte, i.e. the next variable word is also occupied. In this case, the next variable word number must not be used for other variables.

KH or HEX type of variables

- The value of the specified operand is interpreted as a 4-digit hexadecimal number (0...FFFF).
- Keys 0...9 and <Shift> are considered valid keys by the input editor. Numbers A...F are entered by keeping the <Shift> key pressed while simultaneously entering one of the numbers 0...5.
- The valid number of dummies is 1...4.

KM or BIT type of variables

- The value of the specified operand is displayed as a 16-digit bit representation.
- Keys 0 and 1 are considered valid keys by the input editor.
- The valid number of dummies is 1...16.

TXT type of variables

- Here variables represent texts which are stored one after the other in the KDT 624 under different textmessage numbers. This type of text is called an index text.
- In the declaration of the variable, [min] takes the number of the first and [max] takes the number of the last of these texts.
- The number of dummies must be as great as the longest text to be displayed (otherwise, if it is smaller, the text will be cut off).
- The variable word contains the number of the text to be displayed.

Example:

@TXT 13! 760 765

In this example, the output of an index text is declared. Depending on the value contained in variable word 13 one of the texts between number 760 and 765 is displayed instead of the dummy (0 = text number 760, 1 = text number 761, etc.). The KDT 624/623 N permanently reads the variable word for the index. Thus the user can influence the index text at any time even when text is active.



In the older KDT 623 the variable word is only read once when the text is called up.

Example:

@TXT 13 760 765

In this example the value corresponding to the displayed text is written into variable word 13. When the text is called up, the text that corresponds to the value in variable word 13 (0 = text 760, 1 = text 761 etc.) will be displayed first.

The user can now use the +/- key on the KDT to select one of the other available texts (texts 760 to 765 in this case). After confirming the selection by pressing on Enter, the corresponding value is written into variable word 13.

IL or MD type of variables (only in KDT 624/623 N)

A signed 32-bit number is displayed. The number of dummies must be between 2 and 11. Two subsequent variable words are read automatically.

Es werden automatisch zwei aufeinanderfolgende Variablenworte gelesen.

ASC type of variables (only for KDT 624/623 N)

Starting with the low byte of the specified address, the dummies are filled with ASCII characters. The character set defined in the system settings is used (IBM, CPM). If the dummies are assigned to the second (graphic) character set, the characters defined there will be displayed. Only displayable characters are accepted as valid characters (from 20h). An ASCII variable is always considered a display variable and can only be programmed once for each message. The number of dummies is limited to the width of one line.



It is not permissible to display an ASCII variable and to print an ASCII variable at the same time.

The output of ASCII characters is limited by the size of the output mask or by character 00h in the character string.

Indexed variable address (only for KDT 624/623 N)

@[tttt] i1+k [!] [min] [max]

i = variabel address for pointer k = constant

The actual variable address consists of the contents of i1 and the constant k. You must make sure that the sum total of i plus k does not exceed the permissible range of values set for the PLC.

The index register is declared in the same message:

i1 = the first index declaration found,

i2 = the second index declaration, etc.

Example:

@UNS i1+1!

@IDX 100

If variable 100 is equal to 10, the value to be displayed is read from variable 11. The effective address is calculated only once when the text is called up.

Indexed input limits (only for KDT 624/623 N)

If you want to allow the input limits for identical inputs to be changed by the PLC program the input limits can also be indexed.

Index registers are declared like display variables. The limitation to 8 declarations per message stays valid. You thus lose one possible variable per index register. As this only concerns the current message all other messages can contain 8 variables again.

Example:

@UNS 100! I1 I2

@IDX 16

@IDX 17

In this example the maximum limit is read from variable word 17 and the minimum limit is read from variable word 16 once when the text is called up. The input limits are read in the same variable format as the input variables. The example shows a signed 16 bit number.

Software

Scaled variable (only for KDT 624/623 N)

If the numbers to be displayed fall outside the internal range of values for calculation, you have the possibility to scale variables.

Example:

A temperature transducer provides an analog signal of 4...20mA. For optimal resolution this value is converted by the D/A converter into a numerical value of 205...1023. Physically this corresponds to a temperature of 0...100 degrees.

This scaling or normalization of values can be carried out by the variable formats "SUNS" or "SINT". The four threshold points are entered in the line after the variable declaration according to the normalization scheme shown below:
The display variable is read from variable word 25. The scaling range is indicated directly afterwards.

Example:

```
@suns 25!  
@0 100 205 1023  
or  
@sint 25!  
@-50 +100 -200 1023
```

When selecting the range for a scaled display you must consider the fact on the one hand that the number of measuring points cannot be increased. The ratio between display and input should, on the other hand, be selected to be no greater than 1:31 or 31:1 resp..

This is practically no limitation, however, because the range can be further expanded by inserting a decimal point.

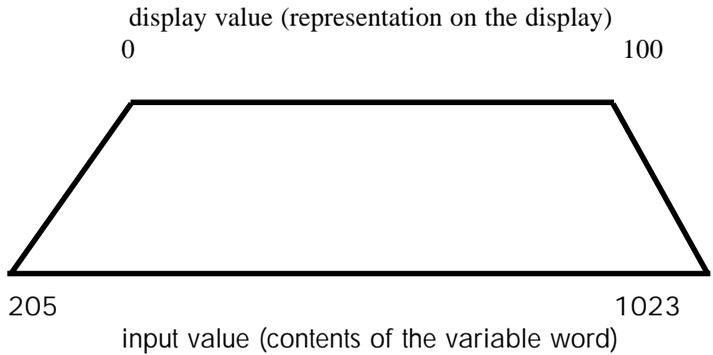
The scaling factor is calculated as follows:

$$\text{factor} = \frac{(\text{display_max} - \text{display_min}) * 2048}{(\text{input_max} - \text{input_min})}$$

The factor is rounded to form integer numbers. The display of a scaled variable is calculated as follows:

$$\text{display} = \frac{(\text{I_value} - \text{I_min}) * \text{factor}}{2048} + \text{B_start}$$

The display value is rounded to form integer numbers.



The input limits correspond to the input range and not to the value range in the PLC.

Example: scaled input variable

@sint 25 -20 +100

@-50 +100 -200 1023

5.12. System messages in the text memory

System and error messages are displayed automatically by the KDT 623/624. In order to be able to translate these into different languages, they are also written into the text memory and can thus be edited by KED623.

These messages start at message number 1000. The following table lists the texts as suggested by the KDT 623 that represent the meaning of the messages.



The system messages are also contained in this form in either file "DEMO623" or "DEMO624" which come to you together with KED623. They can be copied into every new project.

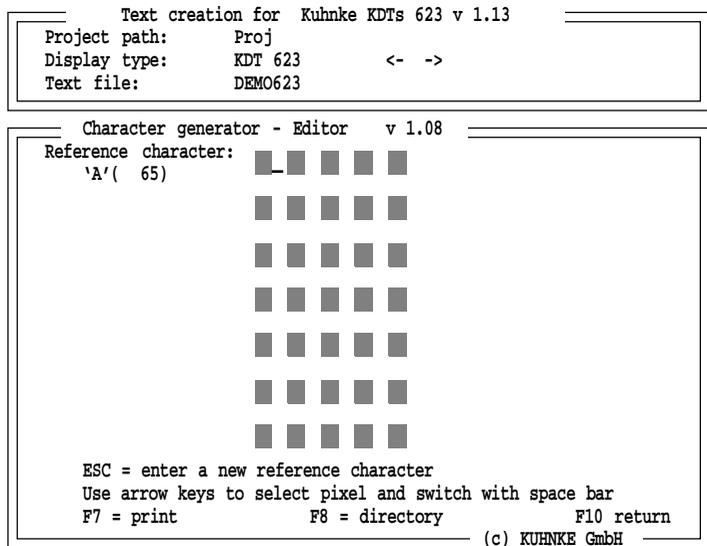
System message 1000	
Variable _ too small. <Enter> continues @ Enter at least _____	9 dummies min.
System message 1001	
Variable _ too big. <Enter> continues @ Enter at least _____	9 dummies min.
System message 1002	
Message > 999 are system messages!	
System message 1005	
Activate programming device: On = <Enter> Off = <0>	
System message 1006	
connect cycles: _____	5 dummies
disturbed of these: _____	5 dummies
System message 1007	
Too many @ lines in message: _____	4 dummies
System message 1008	
No text in message: _____	4 dummies
System message 1009	
Syntax error in message: __ _____	2 dummies 4 dummies
System message 1010	
Wrong VA type M: __ _____	2 dummies 4 dummies
System message 1011	
Wrong number of VA dummies in message: _____	4 dummies
System message 1021	
PLC not in "RUN" mode	
System message 1022	
PC uses the interface of the controller	
System message 1023	
Connection error: _ KDT 623 <-> Controller	1 dummy

5.13. Print textmessage

This command is used to print out all textmessages belonging to the project.

5.14. Edit character set

Choosing this option from the menu opens an editor in which you can generate an additional character adapted to your own needs:



The characters are generated as a 5 x 7 dot matrix. The dots are selected with the arrow keys. Switching of the dots (On/Off) is done via the space bar.

The characters are assigned to a reference character which is accessible via the keyboard. They later appear in the left window of the textmessage editor.

5.15. Print character set

This command is used for printing the entire additional character set.

5.16. Create new files (copy)

This option is used for copying the files of project and character set.



When opening a new project we recommend to first of all copy the file "DEMO.TXT" into "<project name>.TXT". This will simultaneously copy the system settings (see ch.s "5.11.1. and 5.11.3. System settings") and the system messages (see ch. "5.12. System messages in the text memory") so that you need only adapt them if necessary.

5.14. Display directory

Choosing this option lists all project files (<project name>.TXT) and all character set files (*.PIX) stored in the program directory.

5.15. Return to DOS

Exits the KED623 program.

Software

A. Technical specifications

Dialog Terminal KDT 623

Construction	device for front panel fitting
Casing	anodized aluminium
Protection	IP 65 (at the front)
Dimensions WxHxD	288 x 96 x ~50
Front panel cutout	282 x 92 mm
Supply, Power consump.	24 V DC \pm 20 %, typ. 500 mA /max. 1 A
Interfaces	- Com1: V.24 (RS232) for PC connection (text programming) - Com2: V.24 (RS232) for PLC connection (master mode communication)
Display	- dot matrix, yellow LEDs - resolution 5 x 7 pixel - character size ~ 5...6 mm - 2 lines x 24 characters
Light emitting diodes	- 12, red/green, above the function keys - 1, red, next to the i key (info text)
Keyboard	28 short drop keys
Text memory	EEPROM, 32000 text characters
Ambient temperature	0...55 °C (during operation)
Programming	via PC (see software section below)
Order number	633.001.00

Software

KED623	text editor for textmessage generation
Order number	623.501.00
KDTCOM	PC program for simultaneous connection of KDT and KUBES to the controller (part of the KUBES software package)

Connector cables

KDT 623 <->PC (AT)	text programming
Order number	623.151.00
KDT 623 <-> Controller	master mode communication
Order number	613.151.01
KDT 623 <-> PC (AT)	master mode communication, and KUBES
Order number	623.151.02

Appendix A

Dialog Terminal KDT 624

Construction	device for front panel fitting
Casing	anodized aluminium
Protection	IP 65 (at the front)
Dimensions WxHxD	300 x 280 x ~50
Front panel cutout	282 x 125 mm
Supply, Power consump.	24 V DC \pm 20 %, typ. 500 mA /max. 1 A
Interfaces	- Com1: V.24 (RS232) for PC connection (text programming or printer) - Com2: V.24 (RS232) for PLC connection (master mode communication)
Display	- dot matrix, yellow LEDs - resolution 5 x 7 pixel - character size ~ 5...6 mm - 2 lines x 40 characters
Light emitting diodes	- 16, red, above the function keys - 1, red, next to the i key (info text)
Keyboard	32 keys
Text memory	2 x 32 KByte flash-EPROM
Ambient temperature	0...55 °C (during operation)
Programming	via PC (see software section below)
Order number	633.001.xx

Software

KED623	text editor for textmessage generation
Order number	623.501.00
KDTCOM	PC program for simultaneous connection of KDT and KUBES to the controller (part of the KUBES software package)

Connector cables

KDT 624 <-> PC (AT)	text programming
Order number	623.151.00
KDT 624 <-> Controller	master mode communication
Order number	613.151.01
KDT 624 <-> PC (AT)	master mode communication, and KUBES
Order number	623.151.02

B. Character sets

B.1. ASCII table

Bit 0 ... 3 (low nibble)	Bit 4 ... 6 (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 has the hexadecimal value \$15.

The numbers for the following characters depend on the selected country code (values are indicated in hexadecimal numbers):

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

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

Appendix B

C. Literature list / Trade marks

C.1. Literature list

Instruction manual E 211 GB

KUBES

Kuhnke-User-Software

for controllers KUAX 657 and KUAX 667

Kuhnke GmbH

Instruction manual E 237 GB

KUBES 4

Kuhnke-User-Software for individual controllers and network systems (PROFIBUS)

Kuhnke GmbH

Instruction manual E 205 GB

Modu Control KUAX 657

Programmable logic controller

Kuhnke GmbH

Instruction manual E 206 GB

KUAX 667 Pico and Compact Control

Programmable logic controller

Kuhnke GmbH

Instruction manual E 308 GB

Profi Control KUAX 680I

Programmable logic controller

also for networking via PROFIBUS

Kuhnke GmbH

Instruction manual E 312 GB

Modu Control KUAX 657P

Programmable logic controller

also for networking via PROFIBUS

Kuhnke GmbH

Appendix C

C.2. Trade marks

Hercules

is a registered trade mark of the Hercules Computer Technology Inc.

IBM

is a registered trade mark of the International Business Machines Corporation

Microsoft, MS and MS-DOS

are registered trade marks of the Microsoft Corporation

Windows

is a mark of the Microsoft Corporation

D. KDTCOM - Programming and KDT on the V.24 programming interface

The program KDTCOM makes it possible to operate the KDT 623/624 at the programming interface while keeping a simultaneous ONLINE connection to the KUBES programming software.

For this, the PC must be equipped with two V.24 interfaces. You might have to run MS Windows Setup, as a mouse connected to the KDT interface must be installed as Microsoft mouse only.

KDTCOM.EXE is delivered as part of the KUBES software package. It must be stored in the KUBES program directory (e.g. C:\KUBESEXE) which is the directory where the KUBES program files are stored.

To start KDTCOM:

- connect PC and PLC (programming cable into COM1 of the PC)
- connect PC and KDT 623 (programming cable into COM2 of the PC)
- use MM.EXE (or any other terminal program) to check the COM2 interface connection if necessary
- launch KUBES
- open a project
- controller ONLINE
- in WINDOWS 3.x: press <Alt-Tab> to activate Program Manager
- in WINDOWS 2.11: open the MS-DOS window (from the File menu)
- choose "Run" from the File menu
- run KDTCOM
- in KDTCOM, choose "Start" and select COM2
- reduce KDTCOM (and program manager) to icons



KDTCOM will be disturbed if the online connection to the controller is interrupted at any time during operation. After resuming online operation KDTCOM must also be (quit and) restarted.

Appendix D

Index

Symbols

- *BCD 5-7, 5-10
- *binary 5-7, 5-10
- *brightness 5-7, 5-10
- *CPM 5-7, 5-10
- *flash off 5-7, 5-10
- *flash on 5-7, 5-10
- *IBM 5-7, 5-10
- *Kb-colour 5-8
- *Kb-flash 5-8, 5-11
- *Kb-LED 5-11
- *Kb-mode 5-7, 5-10
- *Kb-mode1 5-10
- *scroll time 5-7, 5-10

A

- active operating console 1-4
- ASCII table B-1

B

- BCD (type of variable) 5-16
- BCDL (type of variable) 5-16
- BIT (type of variable) 5-16

C

- character set
 - additional 5-4
- character sets B-1
- communication
 - with the controller 4-1
- configuration
 - change 5-2
- connectors 3-8
- construction of the device 1-1

D

- Danger 2-2
- data transmission
 - principle 1-1
- device connections 3-11

F

- front panel design
 - KDT 623 1-2
 - KDT 624 1-2
- front view
 - KDT 623 3-2
 - KDT 624 3-5

H

- hardware 3-1
- HEX (type of variable) 5-16

I

- info texts 4-14, 5-14
- Information / cross reference 2-2
- input and output variables 5-13
- Installation
 - to be observed 2-3
- INT (type of variable) 5-15
- interface
 - Com1
 - printer port 3-9
 - text programming 3-9
 - Com2
 - controller connection 3-10

Index

K

- KDT 623
 - system settings 5-7, 5-10
- KDT 623 N 1-3
- KDTCOM
 - programming and KDT on the V.24 programming interf D-1
- KED623 5-1
 - installation 5-2
 - menu 5-3
 - program start 5-3
- key mode
 - internal - external 5-11
- keys for numbers and special functions 4-10
- KF (type of variable) 5-15
- KH (type of variable) 5-16
- KM (type of variable) 5-16

L

- literature list C-1
- LNG (type of variable) 5-16

M

- maintenance
 - to be observed 2-4
- modified vowels. *Siehe* umlauts
- monitor type 5-2
- mounting
 - KDT 623 3-2
 - KDT 624 3-6

O

- operand ranges
 - control word 4-8
 - flash LEDs
 - KDT 623 4-5
 - KDT 624 4-2

- function keys
 - KDT 623 4-7
 - KDT 624 4-4
- green LEDs
 - KDT 623 4-5
- language selection 4-11
- LEDs
 - KDT 624 4-2
- printer control 4-13
- red LEDs
 - KDT 623 4-5
- textmessages 4-11

P

- port
 - COM 1
 - printing messages 4-12
- power supply 3-8
- programming
 - the KDT 623 5-1
- programming protocol 1-1
- project name 5-4
- project planning
 - to be observed 2-3

R

- reliability 2-1
- RESET of function keys 5-14

S

- safety 2-1
- servicing
 - to be observed 2-4
- syntax
 - of variable declarations 5-15
- system messages 5-22
 - automatic display 4-14
- system settings
 - accept 5-9, 5-10

T

target group 2-1
task separation
 between controller and KDT623 1-4
technical specifications A-1
text display
 program 5-5
 read 5-5
textmessage 0 5-7, 5-10
textmessages 1-4
trade marks C-2
TXT (type of variable) 5-17

U

umlauts 5-2
UNS (type of variable) 5-15

V

variables
 embedded in the textmessage 4-15

