HBG

Operator's Manual

Instructions for HBG hand-held terminal

SCHLEICHER GmbH & Co. Relais-Werke KG
Pichelswerderstraße 3-5
D-13597 Berlin

Phone ++49 30 33005 - 330
Fax ++49 30 33005 - 305

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HBG hand-held terminal

Purpose of this Operator's Manual

This operator's manual supports the project planning, programming, installation, commissioning and maintenance of the HBG hand-held terminal.

Target Group

This manual is written for trained personnel with specialised knowledge. There are special demands on the selection and education of the personnel, which work on the automation system (for example: electrical engineers or trained and skilled worker). Refer to chapter "1.4 Qualified Operator" for more details.

Trademarks

Contents

1 Safety notes

1.1 Warnings and symbols

Safety notes and warnings are marked within this manual to help avoid danger to personal health and damage to property.

 Danger	This symbol indicates that death, serious bodily injury or considerable property damage will occur if the corresponding precautionary measures are disregarded.
 Warning	This symbol indicates that death, serious bodily injury or considerable property damage may occur if the corresponding precautionary measures are disregarded.
 Caution	This symbol indicates that bodily injury or property damage may happen if the corresponding precautionary measures are disregarded.
 Notice	This symbol indicates that the automation system or other items may be damaged if the corresponding notice is disregarded.
 Important	This symbol indicates important application information or operator directives.

1.2 Fundamental safety regulations

SCHLEICHER automation systems include controllers, as well as controller components (modules), module racks, cables, operator panels and the software for programming, commissioning and operating the systems. This manual only describes one part of the automation system.

SCHLEICHER automation systems have been developed and manufactured in accordance with the European EN 61131-2 product standard for programmable controllers and the German DIN VDE 0160 standard. These standards meet all the safety requirements of the 89/392/EEC machine guideline (European standard EN 60204-1) concerning programmable controllers.

The automation systems will not cause any risk for the health of persons or damage to property if they are used correctly. However, danger may arise when control elements such as motors, hydraulic aggregates etc. or live actuators, machines or other mechanical equipment are connected, or if insufficiently qualified personnel perform improper project planning, installation, maintenance or operation.

1.3 Suitable applications

These automation systems have been developed and build with state-of-the-art technology and on the basis of approved safety guidelines. Nevertheless, danger to the health and the lives of the users or other persons, or damage to machines, plant and other properties can still arise.

The automation systems may be used only as directed, and under flawless technical conditions - and the safety guidelines must be observed. The faultless and safe operation of the controller calls for proper transport, proper storage and installation, as well as careful service and maintenance. In particular, any disturbances affecting the safety of the system must be dealt with immediately.

The automation systems are intended exclusively for the control of machines and plant.

No other use of the automation systems is allowed. The manufacturer cannot be held liable for damage caused by unintended usage.

Note the described instructions about the mechanical and electric construction, about commissioning, maintenance and about the use of the controller to ensure safe and reliable operation.

1.4 Qualified Operators

Warning

All project planning, installation and maintenance work on the automation system may only be carried out by trained personnel (e.g.: skilled electrical fitters, electrical engineers).

The personnel must be familiar with the safety requirements of automation systems.

The operators must be trained to deal with the controller and must be familiar with the operating instructions in this manual.

The personnel must be qualified, with appropriate training and the authority to perform commissioning and maintenance operations.

1.5 Project planning, programming, installation and commissioning

Usually, the automation system forms part of a larger system or plant used to control machines. The manufacturers and users of these machines must pay attention to the 89/392/EEC guideline during project planning, installation and commissioning of the automation system.

In particular cases, national accident prevention regulations such as VBG 4.0 must be observed.

All safety devices of the machine being controlled must operate faultlessly, regardless of the controller status. The emergency stop devices must be effective in all controller operating modes.

The power supply of all the actuators being controlled must be switched off when an emergency stop has to be made,. A safety relay (e.g.: SCHLEICHER type SNO 2002-24) can be used for the purpose.

Precautions must to be taken so that an interrupted controller program can restart faultlessly following power failures or deviations from the rated voltage. In the process, care must be taken to ensure that a dangerous operating mode of the controller can never occur. If necessary, an emergency stop must be made by force.

In order that a cable break (short-circuit) on a signal line does not lead to an undefined controller status, appropriate safety precautions must be taken with the I/O- hardware and software coupling.

Control unit facilities and their corresponding operator terminals must be protected against unintended operation.

1.6 Maintenance

If measurement or testing needs to be made on the active device, the guidelines and instructions of the VBG 4.0 accident prevention regulation must be followed. Suitable electrical equipment and instruments should be used.

Repairs to controller components may only be carried out by authorized personnel. Unauthorized opening and unqualified actions or repairs could lead to bodily injuries or damage to property.

Before opening the control devices, they must always be isolated from the power supply (open the disconnector or remove the power plug).

Controller modules may only be changed under off-circuit conditions. Observe the assembly guidelines when disassembling or installing controller modules.

When changing fuses, only those types that are specified in the system's technical data description may be used.

When changing batteries, only those types which are specified in the system's technical data description may be used.. Used batteries should be disposed as toxic waste.

1.7 Dangers due to electrical energy

After opening the switch cabinet or removing the enclosure, beware that certain parts of automation system carry voltage liable to cause danger.

The user must prevent unauthorized and improper interventions by the operator (e.g.: by locking the switch cabinet).

The operator must be familiar with all hazards and danger potentials possible at commissioning, maintenance and operating, in accordance with the instructions in this manual.

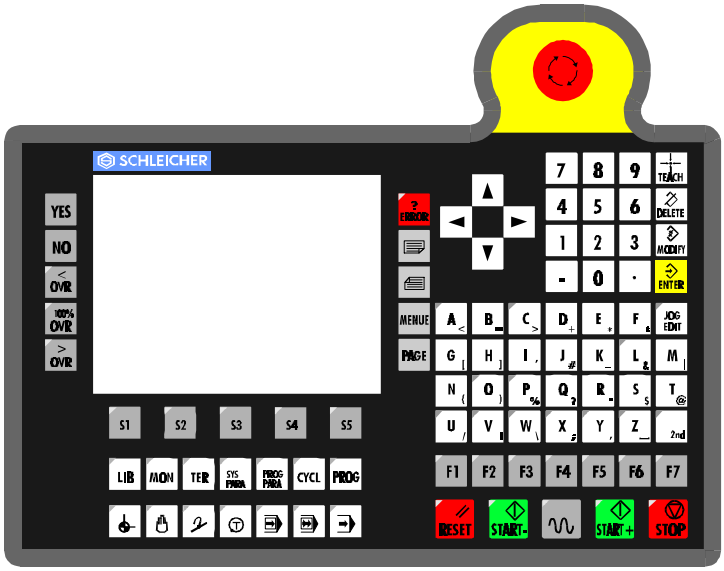
2 Introduction

The hand-held terminal has been developed for application- and customer-specific representation of inputs/outputs of process parameters and messages. The unit can be used to visualize simple processes, with particular reference to CNC. This terminal is functionally compatible with the UTE 2/CNC universal terminal.

As with the UTE 2/CNC, this unit also has a large-surface LCD display. Until now this was only usual on units in higher price categories.

Softkeys and freely letterable function keys with LED display provide for optimal adaption for the application.

The ergonomically shaped housing is particularly striking. It allows effortless working even over longer periods.



2.1 Conventions of representation in this operator's manual

2.1.1 ESC sequences

Escape sequences (ESC sequences) are explained in the operator's manual. The following rules apply:

Hexadecimal numbers are represented with the h symbol as follows.

15h = hex number 15 = decimal number 21

For $1B ESC is written

ESC = 1Bh = hex number 1B = decimal number 27

Spaces in the ESC sequences are inserted solely to improve legibility of the representation. They are not a component of the sequence.

ESC [A stands for ESC[A

The following parameters are used for decimal numbers in the ESC sequences:

Pc, Pl, Pm, Pn, Ps

2.1.2 Representation of keys

In text angle brackets enclose representations of keys. Example:

<ENTER> for the enter key or <3> for the numbered key 3

2.2 Software version

The operator's manual relates to the software version **96.18**

3 SETUP functions

The setup menu is reached using the key combination
<2nd><MENU>

The following main menu appears:

SELFTEST	ADJUSTMENT	SAVE	EXIT
LED	UHG-MODE	YES	YES
KEYBOARD	2nd-LOCK	NO	NO
DISPLAY	CHANNEL		
CHANNEL	FONT		
DEADMAN	STAND BY		
BACKLIGHT			

CURSOR LEFT/RIGHT -> SELECT MAIN-MENU
CURSOR UP/DOWN ----> SELECT SUB-MENU

The four main menu items are selected using the cursor keys.

Left/right. The selection of individual operations is facilitated by the menu guide, visible in the lower area of the display.

3.1 SELFTEST

1. The following functions are tested within this main menu item:

a) LEDs

b) Keypad

c) LC display

d) Interfaces (RS232 & RS422)

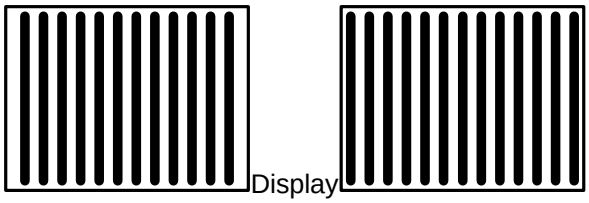
e) Deadman switch

d) Backlight

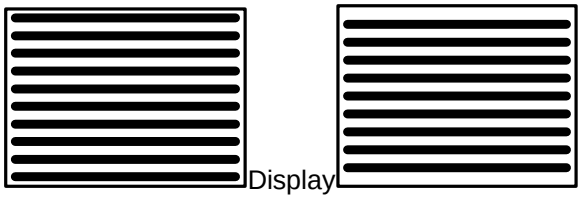
a)
Selecting this submenu item causes all LEDs to be switched on and off in a one-second cycle. If any key is operated an individual test is carried out. The LEDs are selected one after the other ("sequence light").

b)
During the keypad test the scancode or the keycode, depending on the key operated, is represented on the display. (Abort with <ENTER>)

c)
Vertical and horizontal bars, approx. 5 pixels wide, must flash alternately (cycle approx. 1s)



1st Phase 2nd Phase



3rd Phase 4th Phase

d)
With the assistance of a shorting plug (TxD and RxD bridged) and selection of the corresponding interface (via the ADJUSTMENT main menu), the ASCII character set is transferred, compared and displayed.

e)
If this menu item is selected the deadman contact is tested. "Deadman: --> on / off" appears as text, depending on setting.

3.2 ADJUSTMENT

All control mode types can be found in the "adjustment" main menu item. They can be set in the respective operating mode using the ENTER key.

a) UHG-MODE

b) 2nd-LOCK

c) CHANNEL

d) FONT

e) STAND BY

a)
By selecting ("ON"), the compatibility mode for the UHG operator panel is created. (Default: OFF)

b)
The 2nd-Lock control mode allows automatic locking of the <2nd> key and additional operation of another key. In "Unlock" mode the <2nd> key is returned after operation of another key. (Default: LOCK)

c)
Interface switching between RS232 and RS422 is selected with the <ENTER> key. The respective setting is not accepted until HBG setup has been quit. (Default: RS232)

d)
An 8x10 font is selected as standard, but can be replaced by a loadable font. This loadable character set can only be downloaded via the RS232 interface. (Default: DEFAULT)

e)
The stand by mode allows the backlight to be switched off (time out approx. 10 min.), to prolong the life of the fluorescent tubes. Pressing any key reactivates the light. (Default: OFF)

3.3 SAVE

All settings which have been carried out in the ADJUSTMENT main menu can be saved permanently in the internal flash memory.

3.4 EXIT

If "YES" is acknowledged all alterations to setup are accepted by the operating system and HBG setup is quit. But the data is not saved.

4 Keypad

The keypad comprises mechanical short-stroke keys with key forms.

Some keys on the keypad are provided with a second function. The second function is active in second mode (2nd key).
The <2nd> key is processed only internally in the HBG. The control state of the <2nd> key is indicated by the LED integrated in the key.

4.1 Keycode, Scancode and LED addresses

Key	Scancode	Designation	Keycode	LED byte/bit
S1	40			
S2	41	Cursor up	6fh	
S3	42			
S4	43	7	37h	
S5	44	8	38h	
S6	45	9	39h	
S7	46	Teach	03h	
S8	47			
S9	48	Cursor left	70h	
S10	49			
S11	4A	Cursor right	73h	
S12	4B	4	34h	
S13	4C	5	35h	
S14	4D	6	36h	
S15	4E	Delete	7fh	
S16	4F			
S17	50			
S18	51	Cursor down	72h	
S19	52			
S20	53	1	31h	
S21	54	2	32h	
S22	55	3	33h	
S23	56	Modify	07h	

S24	57			
S25	58			
S26	59			
S27	5A			
S28	5B	-	2dh	
S29	5C	0	30h	
S30	5D	.	2eh	
S31	5E	Enter	0ah	
S32	5F			
S33	60	A <	41h 3ch	02/0
S34	61	B =	42h 3dh	02/1
S35	62	C >	43h 3eh	02/2
S36	63	D +	44h 2bh	02/3
S37	64	E *	45h 2ah	
S38	65	F :	46h 3ah	
S39	66	Jog Edit	17h	02/7
S40	67			
S41	68	G [	47h 5bh	
S42	69	H]	48h 5dh	
S43	6A	I '	49h 27h	
S44	6B	J *	4ah 23h	
S45	6C	K _	4bh 5fh	
S46	6D	L &	4ch 26h	02/4
S47	6E	M |	4dh 7ch	
S48	6F			
S49	70	N (	4eh 28h	
S50	71	O)	4fh 29h	02/5
S51	72	P %	50h 25h	02/6
S52	73	Q ?	51h 3fh	
S53	74	R "	52h 22h	
S54	75	S $	53h 24h	
S55	76	T @	54h 40h	
S56	77			
S57	78	U /	55h 2fh	03/0
S58	79	V !	56h 21h	03/1

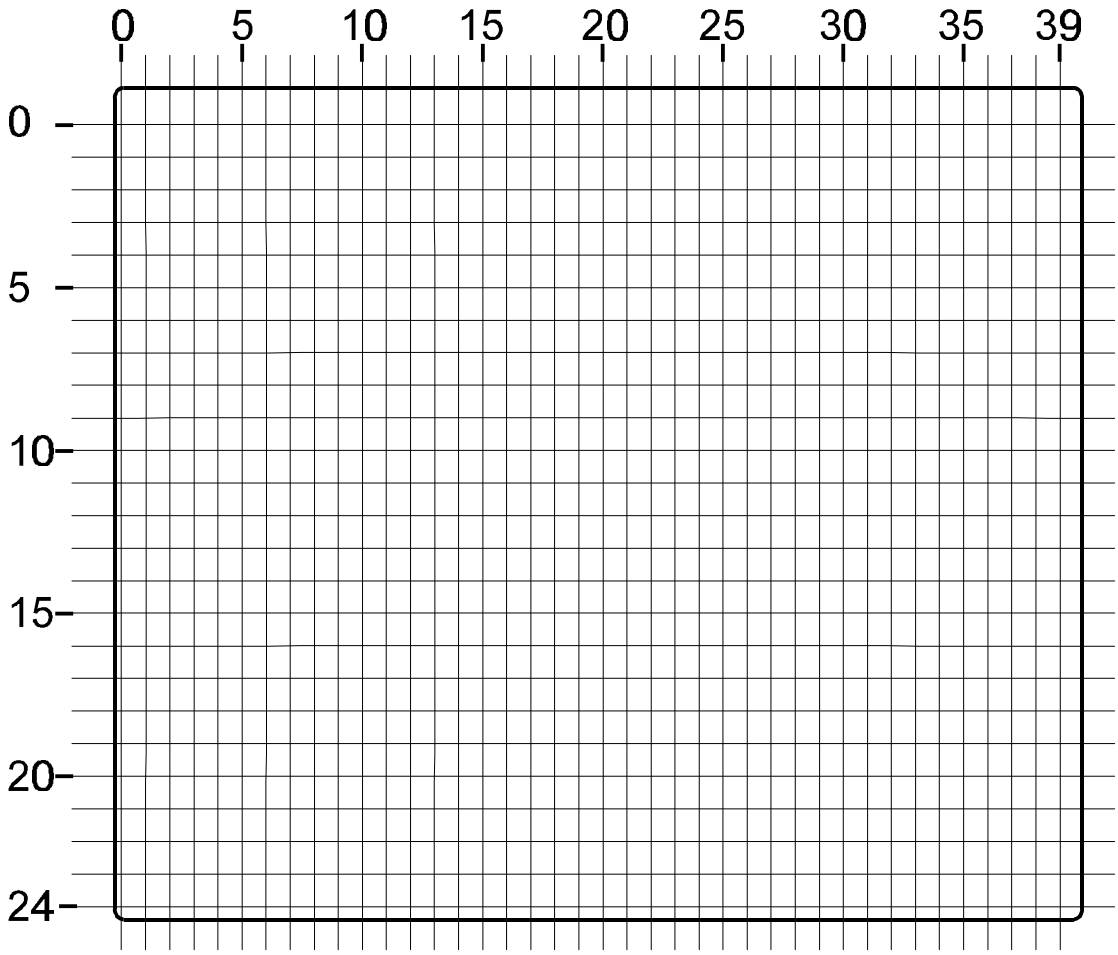
S59	7A	W \	57h 5ch	03/2
S60	7B	X ;	58h 3bh	03/3
S61	7C	Y ,	59h 2ch	03/4
S62	7D	Z Blank	5ah 20h	03/5
S63	7E	2nd		03/6
S64	7F			
S65	C0	F1	<10h><62h>	04/0
S66	C1	F2	<10h><63h>	04/1
S67	C2	F3	<10h><64h>	04/2
S68	C3	F4	<10h><65h>	04/3
S69	C4	F5	<10h><66h>	04/4
S70	C5	F6	<10h><67h>	04/5
S71	C6	F7	<10h><68h>	04/6
S72	C7			
S73	C8	Reset	18h	05/0
S74	C9	Start-	0eh 1dh 1fh	05/1
S75	CA	Rapid	1ah	05/2
S76	CB	Start+	0fh 1ch 1eh	05/3
S77	CC	Stop	19h	05/4
S78	CD			
S79	CE			
S80	CF			
S81	D0	S1	<10h><72h>	06/0
S82	D1	S2	<10h><73h>	06/1
S83	D2	S3	<10h><74h>	06/2
S84	D3	S4	<10h><75h>	06/3
S85	D4	S5	<10h><76h>	06/4
S86	D5	Page	05h	
S87	D6	Menu	04h	
S88	D7			
S89	D8	Lib	68h	01/0
S90	D9	Mon	69h	01/1
S91	DA	Ter	6ah	01/2
S92	DB	Sys Para	6bh	01/3
S93	DC	Prog Para	6ch	01/4

S94	DD	Cycl	6dh	01/5
S95	DE	Prog	6eh	01/6
S96	DF			
S97	E0	Ref. point	61h	00/0
S98	E1	Manual mode	62h	00/1
S99	E2	Reposition	63h	00/2
S100	E3	Program test	64h	00/3
S101	E4	Single record	65h	00/4
S102	E5	Block record	66h	00/5
S103	E6	Record sequence	67h	00/6
S104	E7			
S105	E8	Yes	71h	
S106	E9	No	74h	
S107	EA	Ovr <	0bh	07/0
S108	EB	Ovr 100%	01h	07/1
S109	EC	Ovr >	12h	07/2
S110	ED	Error	77h	07/3
S111	EE	Page up	75h	
S112	EF	Page down	76h	

5 Display

The HBG is equipped with an LED matrix display. The display is operated in text mode.

The HBG display is divided into 24 lines (0-23) and 40 columns (0-39).



5.1 Setting the brightness

The brightness of the LC display can be set using <2nd> and the cursor keys. (not active in SETUP)

<2nd> <Cursor up> brighter

<2nd><Cursor down> darker

5.2 Controlling the cursor

5.2.1 VT100 sequences

Delete display **ESC [Ps J**

Ps = 0	Delete from current cursor position (inclusive) to end of display
Ps = 1	Delete from home position to current position (inclusive)
Ps = 2	Cursor home and delete complete display

Position cursor **ESC [H**

Home position, meaning top line (1) and leftmost column (1)

ESC [Pl ; Pc H

The cursor is moved to line Pl and column Pc. The positions are limited to the left and right edge columns and the top and bottom lines.

Delete line **ESC [Ps K**

Ps = 0	Delete from current cursor position (inclusive) to end of line
Ps = 1	Delete from left edge to current position (inclusive)
Ps = 2	Delete complete line

Make cursor invisible **ESC [? 2 5 l**

The current cursor position is not altered. Default setting is a visible cursor

Make cursor visible **ESC [? 2 5 h**

The current cursor position is not altered. Default setting is a visible cursor

Negative character output **ESC [7 m**

Negative representation of all characters. Default setting is positive representation (= white lettering on black background)

Set normal representation **ESC [0 m**

All characters are represented with the default setting (normal type size, positive representation)

Text- zoom **ESC [8 m**

All characters are represented with double type width and double type height.

5.2.2 Televideo sequences

Delete display and cursor home

ESC :

Delete line from cursor position to end of line

ESC T

Move cursor to line Pl and column Pc

ESC = Pl Pc

Make cursor visible

ESC . 4

Make cursor invisible

ESC . 0

Negative character output

ESC (

Positive character output

ESC)

6 PCX image output

ESC [Pl ; Pc ; Pn p

Pl : Line (in pixels. Top is line 1)

Pc : Column. (in pixels. Left is column 1)

Pn : Image no. (0..255)

7 Terminal query

ESC [c

The HBG2 terminal answers this query from the CNC control system with : ESC [? 2 1 U

8 Activation of LEDs

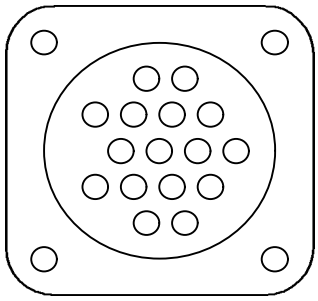
ESC K <14h> <LED matrix> The LED matrix comprises 11 bytes

Matrix byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 1	REF	HAND	REPO	TEST	SINGLE	BLOCK	AUTO	
Byte 2	LIB	MON	TER	Q-PARA	R-PARA	CYCL	PROG	
Byte 3	A	B	C	D			JOG	
Byte 4						L		
Byte 5		O	P					
Byte 6	U	V	W	X	Y	Z		
Byte 7		RAPID	START+	START-	STOP	RESET		
Byte 8	OVR<	OVR100	OVR>			ERROR		
Byte 9	GF7	GF6	GF5	GF4	GF3	GF2	GF1	
Byte 10			S5	S4	S3	S2	S1	
Byte 11								

9 Connections

9.1 Connector pin assignment

AMP CPC receiver housing with flange 16-pin (rear)



Pin number	Designation	Comment
1	Shield	
2	TxD (RS232)	
3	RxD (RS232)	
4	Deadman contact 1	Potential-free
5	Deadman contact 2	Potential-free
6	EMERGENCY STOP make contact	Potential-free
7	0VRS	Reference voltage for V.24
8	24V	Voltage supply
9	0V	Voltage supply
10	EMERGENCY STOP make contact	Potential-free
11	TxD+ (RS422)	
12	TxD- (RS422)	
13	RxD+ (RS422)	
14	RxD- (RS442)	
15	EMERGENCY STOP break contact	Potential-free
16	EMERGENCY STOP break contact	Potential-free

Harting connector HAN 24 DD

Pin number	Designation	Colour identification
1	Shield	Shielding
2	TxD (RS232)	Black
3	RxD (RS232)	Brown
4	Deadman contact 1	Black
5	Deadman contact 2	Red
6	EMERGENCY STOP make contact	Black
7	0VRS	Orange
8	24V	Black
9	0V	Yellow
10	EMERGENCY STOP make contact	Black
11	TxD+ (RS422)	Green
12	TxD- (RS422)	Black
13	RxD+ (RS422)	Blue
14	RxD- (RS442)	Black
15	EMERGENCY STOP break contact	Violet
16	EMERGENCY STOP break contact	Black

Important: RTS and CTS must be connected together on the Promodul-U.

All contacts are brought out potential-free and can be loaded with a maximum of 2A.

9.2 Interfaces on the Promodul-U

The following CONTROL interfaces (25-pin D-Sub) can be assigned on the Promodul-U:

1. Interface RS 232C

Pin number	Designation
1	Shield
2	TxD
3	RxD
4	RTS
5	CTS
7	0VRS

2. Interface RS 422

Pin assignment	Designation
7	0VRS
14	CTS-
15	CTS+
16	TxD+
17	TxD-
18	RTS-
19	RTS+
20	RxD-
21	RxD+
25	+5V

10 Technical data

Interfaces:	Isolated RS232C or RS422 (optional) Baud rate: at present 9600 bits/second Transmission norms: Televideo (UHG) and VT100 function-compatible
CPU:	Motorola 68302
RAM:	512kB x 8
Flash:	4MBit
Deadman key	Evaluated internally, also external as potential-free contact
EMERGENCY STOP switch:	2 x break contact (potential-free) max. 2A continuous current 1 x break contact and 1x make contact (customer-specific) (potential-free) max. 2A continuous current
Keypad	82 short-stroke keys and 50 LEDs Sliding strip insert possible for series <F1> to <F7>
Display:	Passive monochrome LC display Resolution: 320 (H) x 240 (W) pixels (1/4 VGA)
Voltage supply:	24V DC +/- 20% Polarity reversal protection through diode
Power consumption:	7W
Connection system:	With 16-pin CPC screwed gland Oil-resistant cable (black)
Weight:	approx. 1.4 kg
Dimensions:	179 (W) x 288,5 (H) x 35 (D) (with grip: 75) mm

Climatic conditions	
Ambient operating temperature	5 ... +40°C (category LY acc. to DIN 40040), vertical installation, free air circulation
Storage temperature	-10 ... +60°C (category IU acc. to DIN 40040)
Relative humidity	30 ... 95% (category F acc. to DIN 40040), dew free
Air pressure in operation	860 ... 1060 hPa

Mechanical strength	
Vibration	In accordance with DIN IEC 68-2-6 10 ... 57 Hz constant amplitude 0.075mm 57 ... 150 Hz constant acceleration 1 g

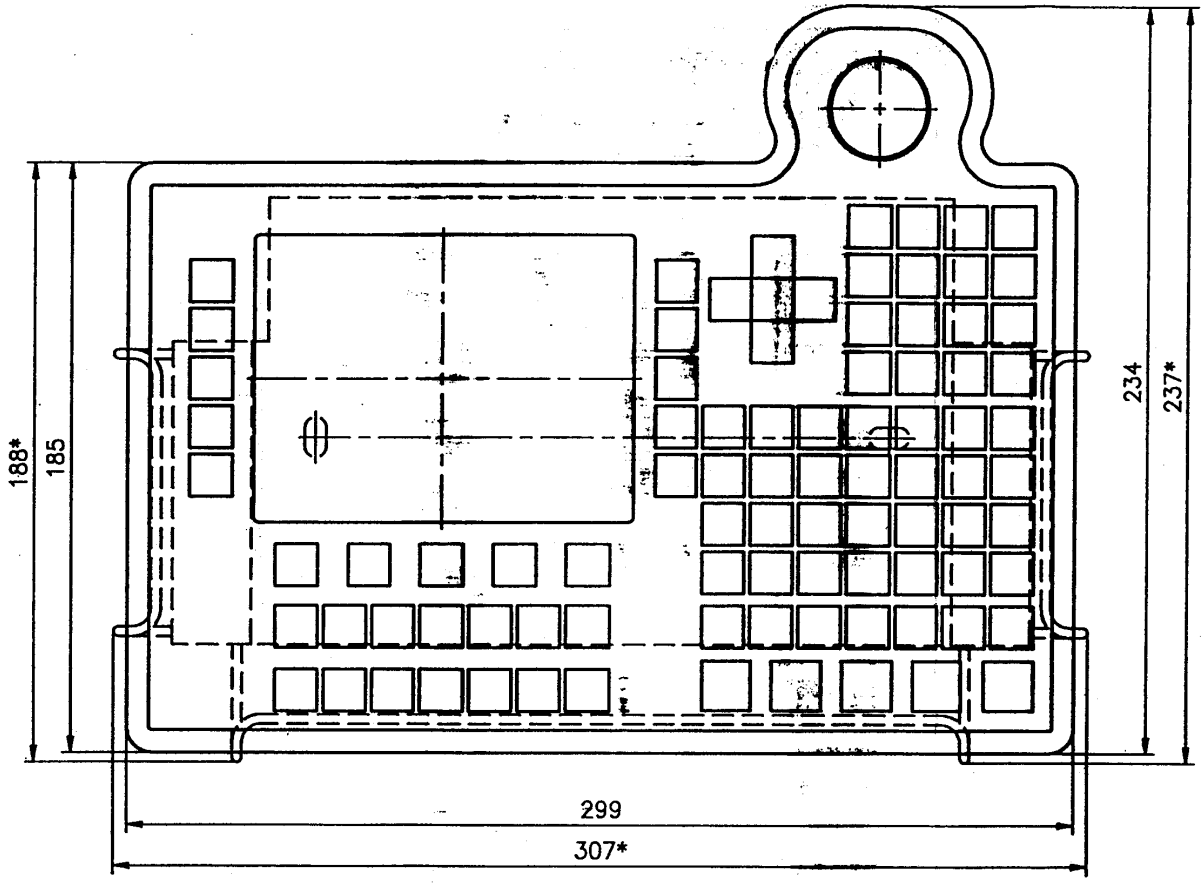
Electrical safety	
Protection type	IP 54 acc. to EN 60529
Clearance / creepage distance	In acc. with DIN EN 61131-2 and DIN EN 50178 between electrical circuits and bodies as well as between decoupled electrical circuits corresponding to overload category II, contamination level 2
Test voltage	AC 350 V/50Hz for nominal equipment voltage DC 24V

Electromagnetic compatibility*	
Electrostatic discharge	Acc. to EN 61000-4-2: 8 KV air discharge, 4 KV contact discharge
Electromagnetic fields	Acc. to ENV 50140: field intensity 10 V/m, 80 ... 1000 MHz
Burst	Acc. to EN 61000-4-4: 2 KV on DC supply lines, 1 KV on I/O signal and serial interface lines
Interference emissions	Acc. to EN 55011: Limit category A, Group 1

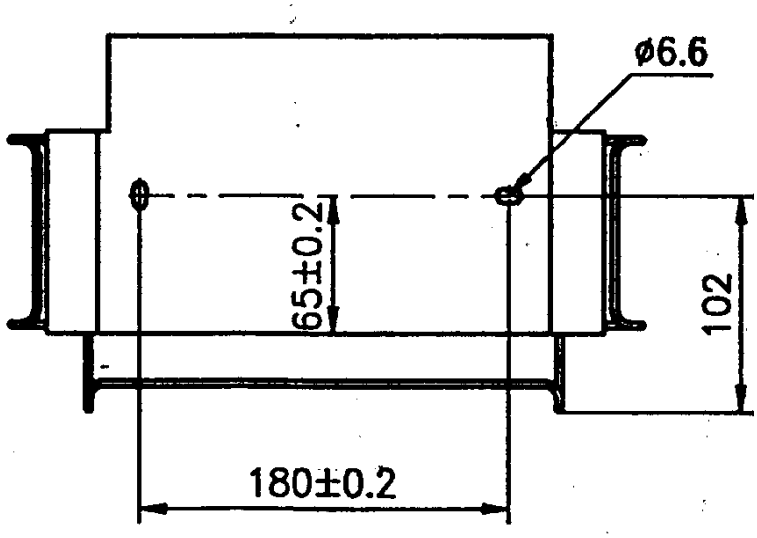
*only with connection cable HBG K2-7, HBG K3-7

11 Dimension drawing

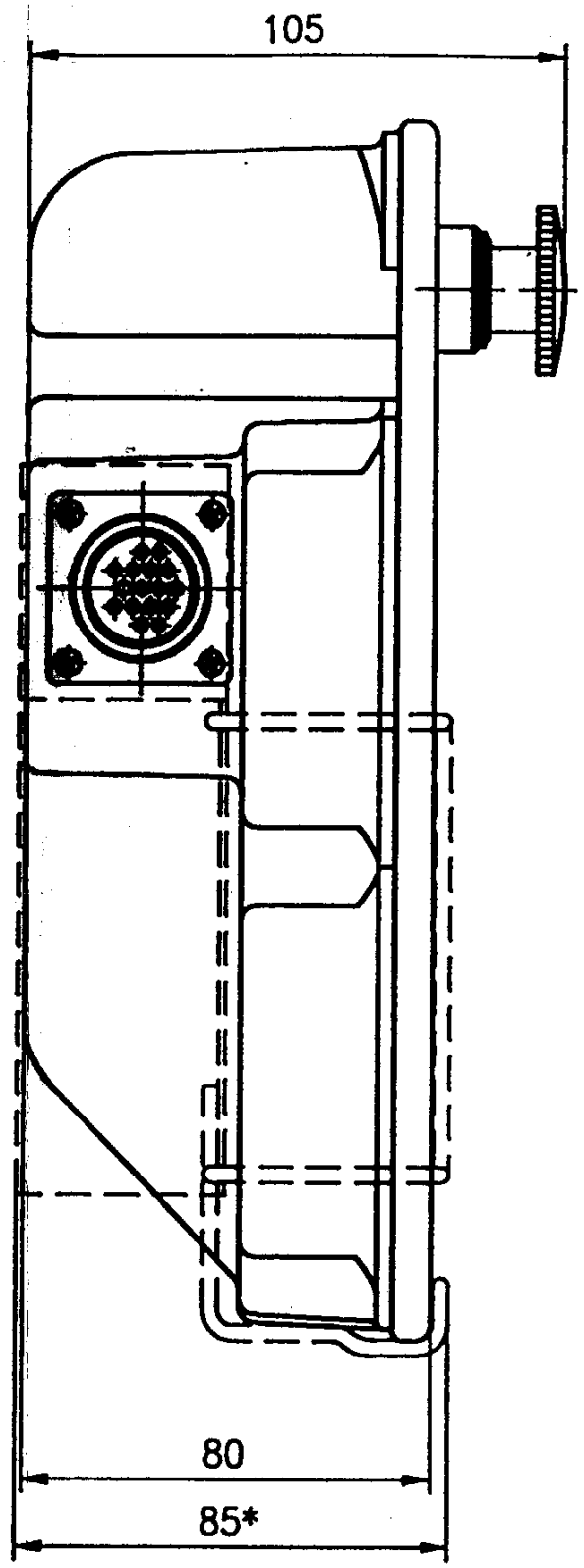
11.1 Front view



11.2 Position and size of mounting holes



11.3 Side view



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