HEYNAU

ALCATEL

Handbook

Electronic Programmer

ES 32

Field Copy.

ANTRIEBSTECHNIK REGELUNGSTECHNIK · HEYNAU Mechanische Antriebe · HEYNAU Antriebs-Elektronik · RAMSTETTER Programm-, Steuerungen

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OPERATING INSTRUCTIONS ES 32

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The details of this data sheet refer to the specifications of products but do not represent a guarantee of characteristics.
Availability and right to change reserved.

October 1987

1. VERSIONS

The electronic programmer ES 32 is a sheet steel enclosed unit (144 x 144 x 210 mm), which is suitable for panel or rack mounting.

The ES 32 is available with the following input/output configurations to suit all applications:

	Type:	Outputs (relay):	Inputs (24V=):
1.1	ES 32-10	8	0
1.2	ES 32-110	12	4
1.3	ES 32-11	8	8
1.4	ES 32-111	12	12
1.5	ES 32-20	16	0
1.6	ES 32-120	20	4
1.7	ES 32-21	16	8
1.8	ES 32-121	20	12
1.9	ES 32-22	16	16
1.10	ES 32-30	24	0
1.11	ES 32-130	28	4
1.12	ES 32-31	24	8
1.13	ES 32-40	32	0

2. CONSTRUCTION

2.1 Front view

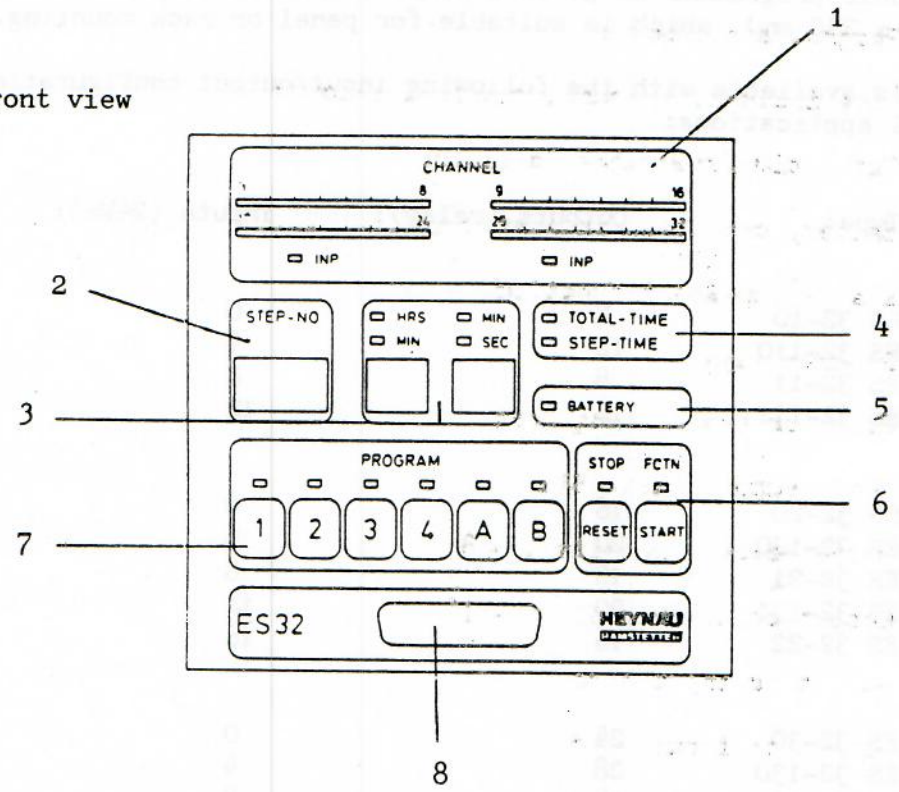


Fig. 1

2.2 Rear view

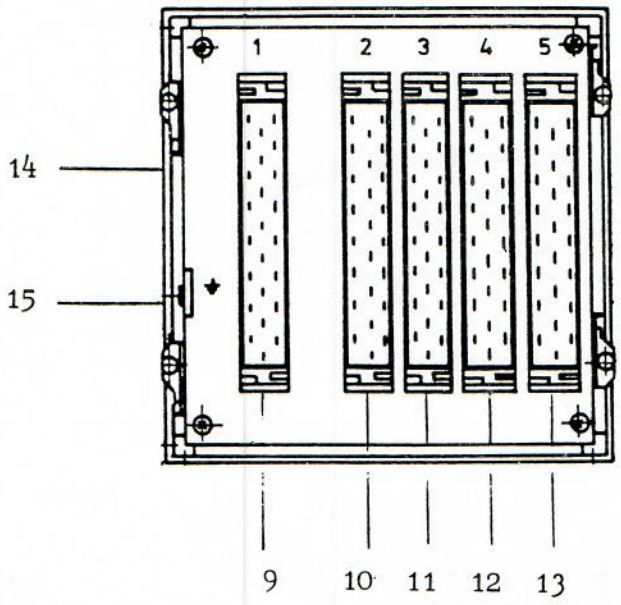


Fig. 2

2.3 Explanatory notes to construction (figs. 1 and 2)

1 Channel indicator 1 - 32

2 Program step number

3 Time indicator, hours, minutes, seconds

4 Total time/step time indicator

5 Battery condition indicator (buffer battery)

6 Start-Stop-Reset function

7 Program keys

8 Plug for programming unit

9 Power supply card, SVG

10 Output card, channels 1 - 8

11 Output card, channels 9 - 16

12 Output or input card

13 Output or input card

14 Housing (sheet steel)

15 Earthing connection

3. DESCRIPTION

The ES 32 electronic programmer represents a development of the traditional electromechanical and photoelectrical program control devices. Owing to its compact construction and simple operation the unit is suitable for subordinate tasks within larger control systems.

The central component of the unit is a microprocessor which controls the operating sequence. As the program is carried in semi-conductor memory, mechanical moving parts become redundant; enabling the unit to offer in addition to higher service life, a considerable increase in switching speed.

The modular construction of the ES 32 allows economical installation even in the smallest control applications. The minimal configuration of the ES 32 comprises:

- Power supply SVG

- Microprocessor card MPK

- Indicator card ANZ

- Bus card BUS

and 2 relay output cards RAK (16 outputs).

The unit may be expanded to a maximum of 32 channels by insertion of two input or output cards.

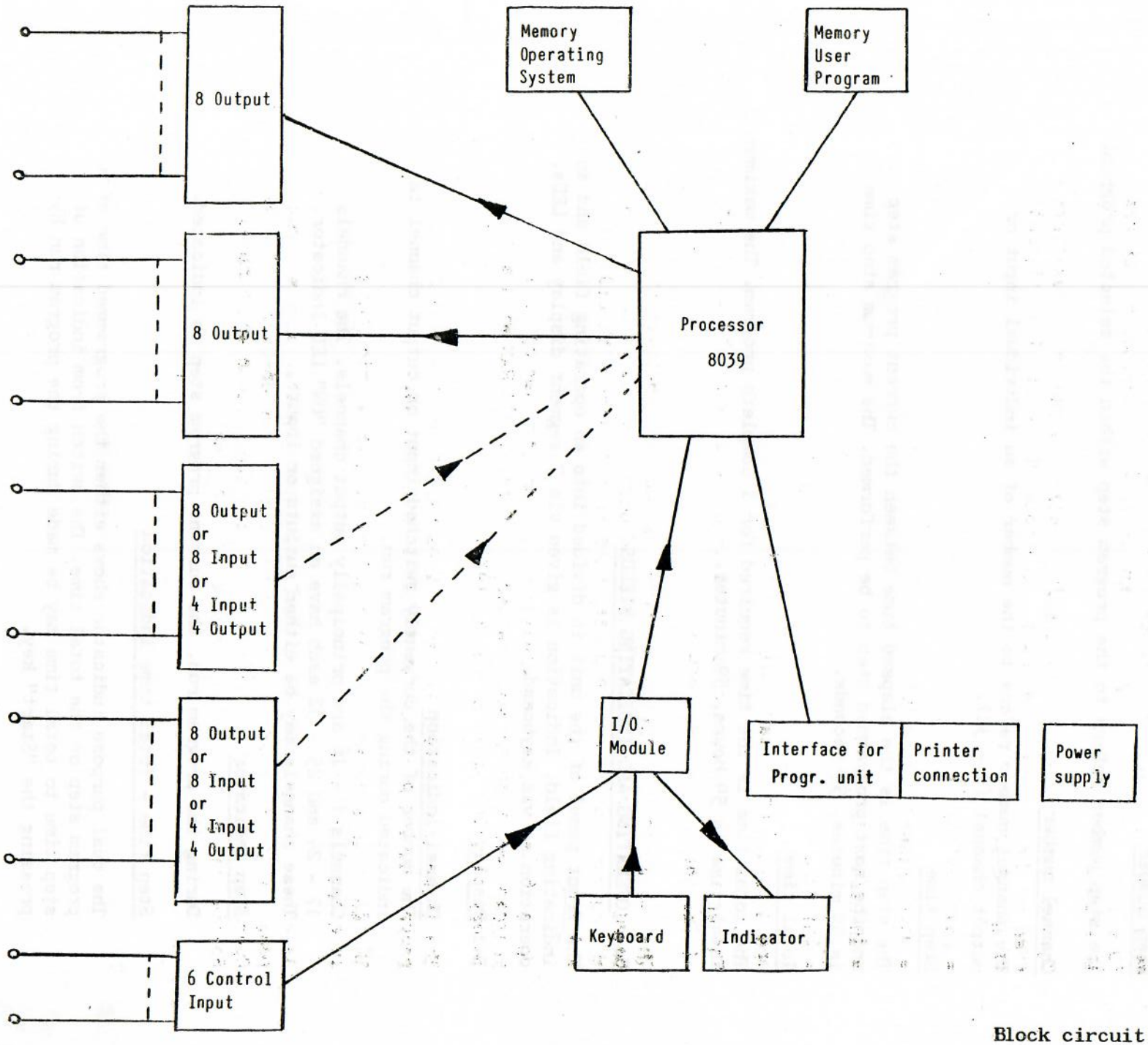
The selection and start of a program is accomplished via the keyboard located on the front panel. The output condition as well as the current step number and step time is indicated with LEDs and a 7 segment display.

Up to 16 programs may be present in the program memory. The program memory comprises a battery buffered C-MOS RAM with a memory capacity of 4096 x 8 Bit (4K).

The integrated battery buffer ensures retention of the user program during periods when supply is not available.

The ES 32 is programmed using a programming unit which plugs into the front panel.

As an aid to the programming, LED indicators located on the front panel of the programming unit serve to guide the operator (DIALOG). Operation of the programming unit is therefore clear and simple. Special programming experience is not necessary.



Block circuit diagram

4. DEFINITIONS

- ES 32 -

Program number

The program number (1 - 4, 1A - 4A, 1B - 4B, 1AB - 4AB) refers to the number which a complete user program is stored.

Step number

The step number refers to the program step within the selected program.

Channel number

The channel number refers to the number of an individual input or output channel (1 - 32).

Step time

The step time is the elapsed time between the current program step and the next programmed step to be performed. The maximum step time is 59 minutes, 59 seconds.

Total time

The total time is the time required for 1 complete program. The maximum total time is 59 hours, 59 minutes.

5. OPERATING AND INDICATING FIELDS

The front panel of the unit is divided into an operating field and an indicating field. Indication is given via 7 segment display and LEDs, operation is via keyboard.

5.1 Display

Channel indication

The number of the currently switched input or output channel is indicated during the program run.

Channels 1 - 16 are principally output channels. The channels 17 - 24 and 25 - 32 each have an assigned "ON" LED indicator. These channels may be either outputs or inputs.

Step indicator

During the program run, the current program step is indicated.

Step time - Total time indication

The dual purpose indicator shows either the programmed time of a program step or the total time. The switch from indication of step time to total time may be made during the program run by pressing the "Start" key.

The programmed value of the step time is indicated at the start of the step and is decremented to zero in seconds. At the end of this operation the next program step time is indicated.

The total time indication begins with zero and is incremented in minutes.

Battery condition indicator

The unit features an integrated buffer battery for the C-MOS RAM program memory. If the voltage level sinks below an acceptable level the indicator "Battery" is energized and indicates battery replacement is required. The buffer time for lithium batteries is approx. 8 - 10 years.

5.2 Keyboard

Program keys

The programming keys 1, 2, 3, 4, A and B may be used to call up 16 different programs.

The programmer is provided with an inbuilt audible signal that sounds with every operation of the programming keys.
With each operation of a programming key a brief whistle tone is heard, so as to advice the programmer a key has been pressed.

Using combinations of the alpha numerical keys the following 16 program numbers are available:

1	2	3	4	Program	1	2	3	4
1A	2A	3A	4A	Program	5	6	7	8
1B	2B	3B	4B	Program	9	10	11	12
1AB	2AB	3AB	4AB	Program	13	14	15	16

The selected program is indicated with LEDs assigned to the individual keys.

Start

The selected program is run after depressing the key "Start".
The program starts at step no. 1.
In addition the LED marked "FCTN" lights up.
For external indication of this function a transistor output signal (30V/100mA, open collector) is available and can be utilized in conjuction with a 330 ohm resistor and an LED.

Note: This output is not suitable for connection to or control of relays.

After starting a program the "Start" key may be used to change the step time indicator to total time indicaton. This may be reversed to step time by a second depression of the "Start" key.

Reset

The "Reset" key allows the operator to void a selected program. This operation i.e., correction of the program number, can only be carried out before the program is started. During the program run the program keys are deactivated.

After a program has been started, depression of the "Reset" key can halt the program. The LED "FCTN" goes out and the LED "STOP" lights up. The step time is suspended and the programmed inputs are disengaged during the "STOP" period. All programmed outputs remain on.

An ensuing depression of the "Reset" key causes the program to be reset. The unit may be restarted after entering a program number.

If the program is to be continued from its halted position, the "Start" key is depressed. The LED "STOP" goes out and the LED "FCTN" lights up.

For external indication of the "Stop" function a transistor output signal (30V/100mA, open collector) is available and can be used in conjunction with a 330 ohm resistor and an LED.

Note: This output is not suitable for connection to or control of relays.

6. OUTPUTS (RAK)

The outputs of the digital switching signals are via relay contacts. An output card (RAK) includes 8 relays; 5 with changeover contacts and 3 with make contacts, all are brought out in a 24 pole plug.

The maximum switching current per channel is 5A.

In general, the following switching capacity values apply for each output:

24V D.C.	125 W	ohmic load
220V A.C.	1100 W	ohmic load

The switching capacity is reduced for inductive loads, the limit current value of 0,35A is valid for 220V A.C., $\cos \varphi = 0,4$.

A protection circuit with RC elements, varistors or fly wheel diodes is recommended when switching inductive loads.

These measures serve a considerably increase the life of the relay contacts.

7. INPUTS (DEK)

Input cards for the ES 32 are available for processing input signals. The input cards DEK feature 8 optocoupled galvanically isolated inputs. All inputs are 2 pole and are brought out separately to a 24 pole plug. The inputs have integrated diodes for protection against reversed polarity and RC element filters to reduce the effects of carrier waves and interference.

The standard cards are suitable for 24V D.C.. The rated current, for which a fault free energization is guaranteed, is 8mA. The maximum input current for fault free de-energization is 0,6mA.

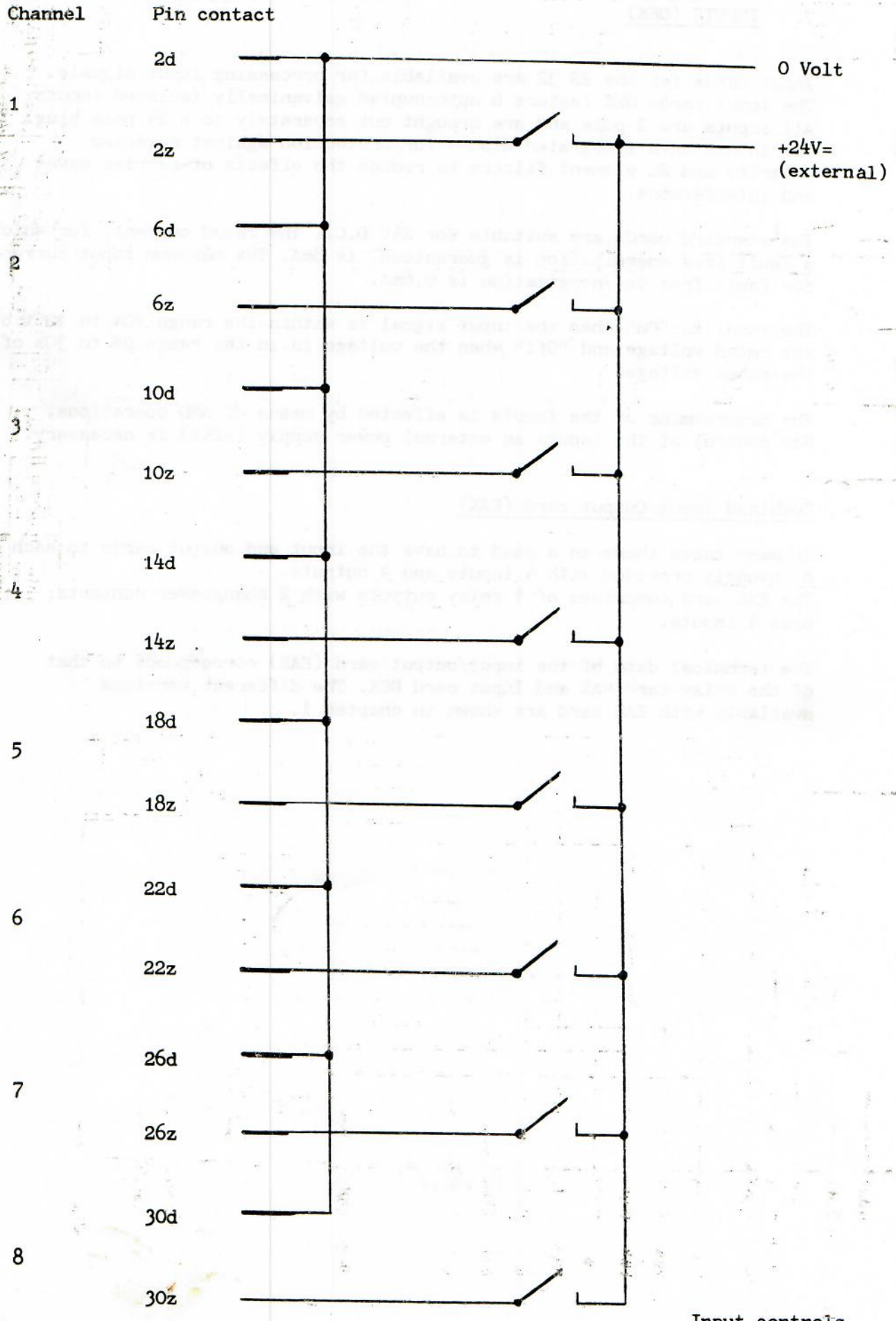
The input is "On" when the input signal is within the range 70% to 120% of the rated voltage and "Off" when the voltage is in the range 0% to 30% of the rated voltage.

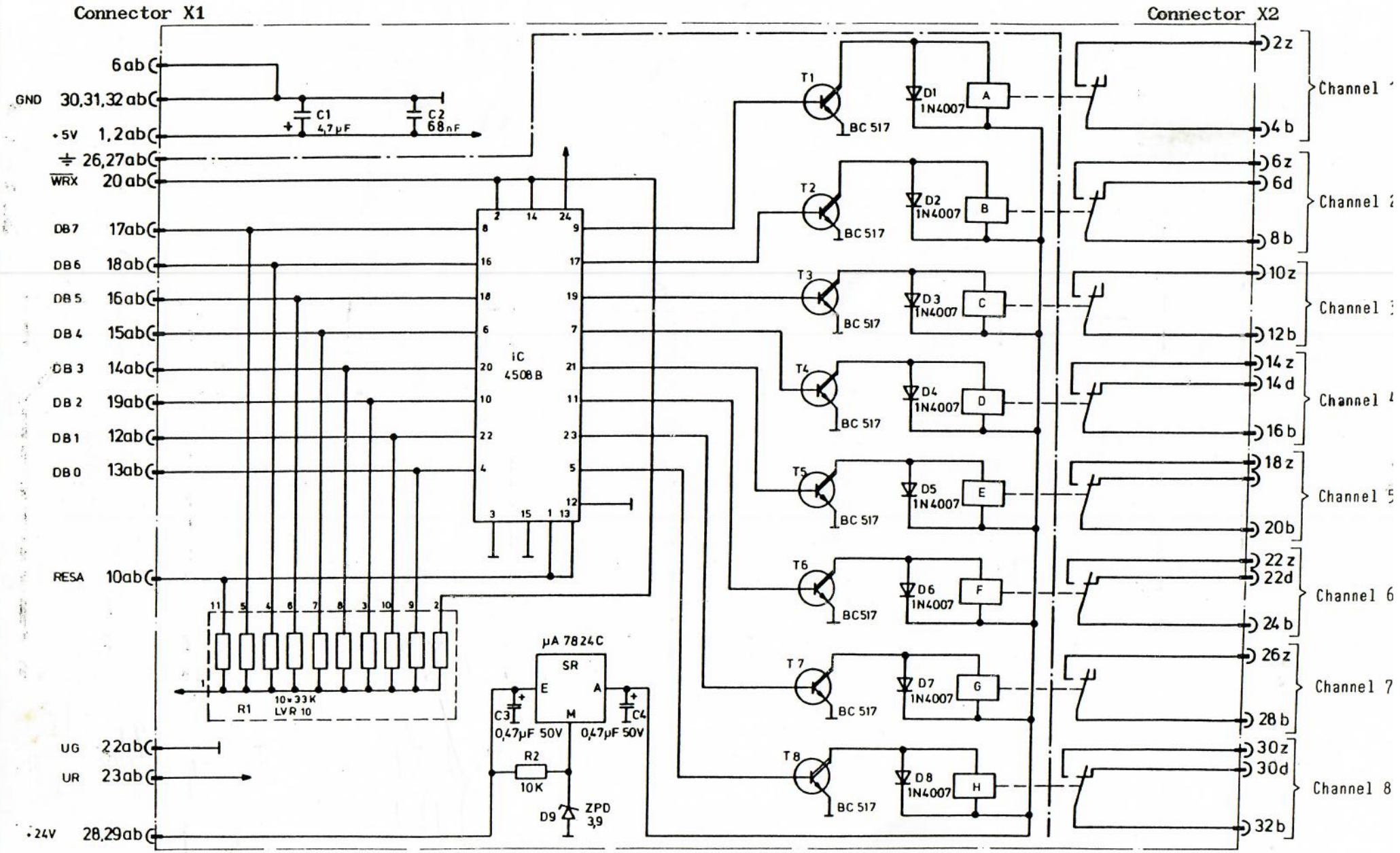
The programming of the inputs is effected by means of AND operations. For control of the inputs an external power supply (+24V) is necessary.

Combined Input/Output card (EAK)

In many cases there is a need to have the input and output cards to each 8 channels provided with 4 inputs and 4 outputs.
The EAK card comprises of 4 relay outputs with 2 changeover contacts, plus 4 inputs.

The technical data of the input/output card (EAK) corresponds to that of the relay card RAK and Input card DEK. The different versions available with EAK card are shown in chapter 1.


Channel
Pin contact
2d
0 Volt
1
2z
+24V=
(external)
6d
2
6z
10d
3
10z
14d
4
14z
18d
5
18z
22d
6
22z
26d
7
26z
30d
8
30z
Input controls



	Datum	Name	Ind.	Änderung	Datum	Name
Gez	12.9.83		2	1469	6.12.83	Kai
Gepr	14.9.83		1	1444 NA	12.9.83	Lind

HEYNAU RAMSTETTEN

Maßstab —

Circuit diagram RAK card

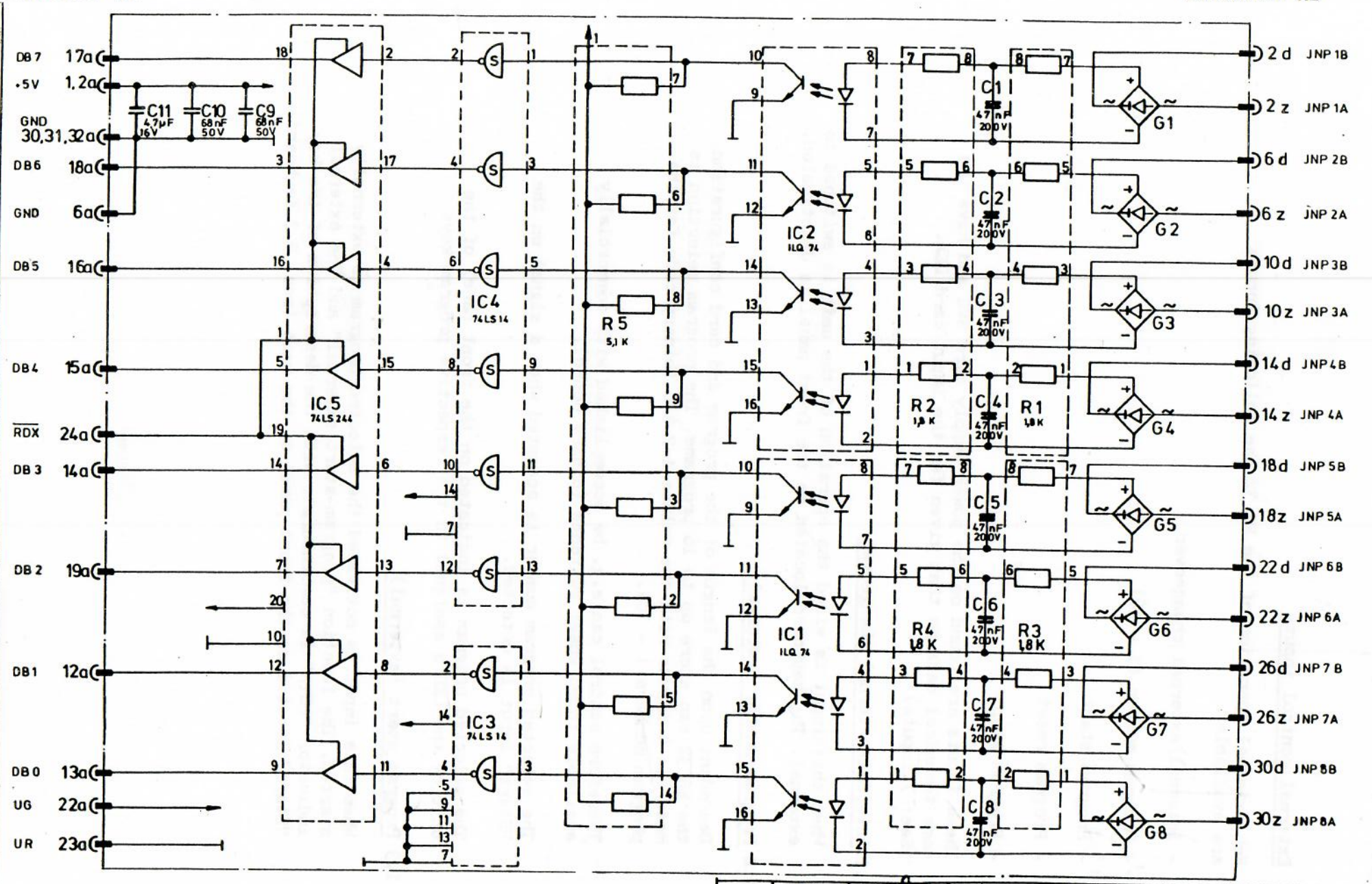
WKZ 65

Zeichnungs Nr SB91-SP1 2)

Abl | Ers F | Ind | Ers D

Connector X1

Connector X2



	Datum	Name	Ind	Änderung	Datum	Name	
Gez	7.4.83						HEYNAU RAMSTETTER
Gepr	20.7.83		1	1433 NA	20.7.83		
Maßstab %	Circuit diagram DEK card				WKZ 65	Zeichnungs Nr SB 92-SP	
Abt	Ers. F	Ind.			Ers D	Ind.	

7.1 External control inputs

For external operation of the ES 32 the following inputs are available:

- Internal/external changeover
- Program number (1 - 16)
- Program start
- Program reset
- Program step

These inputs are found on the power supply card SVG and have the same technical data as that given for the input card DEK. (See: 7.Inputs)

7.1.1 Internal/external changeover

When this input is wired the operation of the unit is switched to external. The keyboard located on the front panel is deactivated.

7.1.2 Program number (external)

Dependent upon the length of the program and card configuration, the ES 32 can store up to 16 programs. The program selection is made via 4 inputs with the values 1-2-4-8 (binary code for the program numbers 1 - 16).

Therefore control can e.g. be accomplished with commercially available thumb wheel switches (binary coded).

The selected program number is accepted when a signal on the "Start" input is detected.

The selected program is indicated on the front panel of the unit by the LED's assigned to the respective program keys.

7.1.3 Program start (external)

When this input is activated the selected program is externally started. The function "program-start external" and the external indicator "FCTN" is commensurate with the description of the key "Start" located on the front panel of the unit (see: 5.2 Keyboard).

7.1.4 Program reset (external)

Activation of this input, causes the function "Reset" to be carried out. The function "Reset external" and the external indicator "Stop" is commensurate with the description of the key "Reset" located on the front panel of the unit (see: 5.2 Keyboard).

7.1.5 Program step

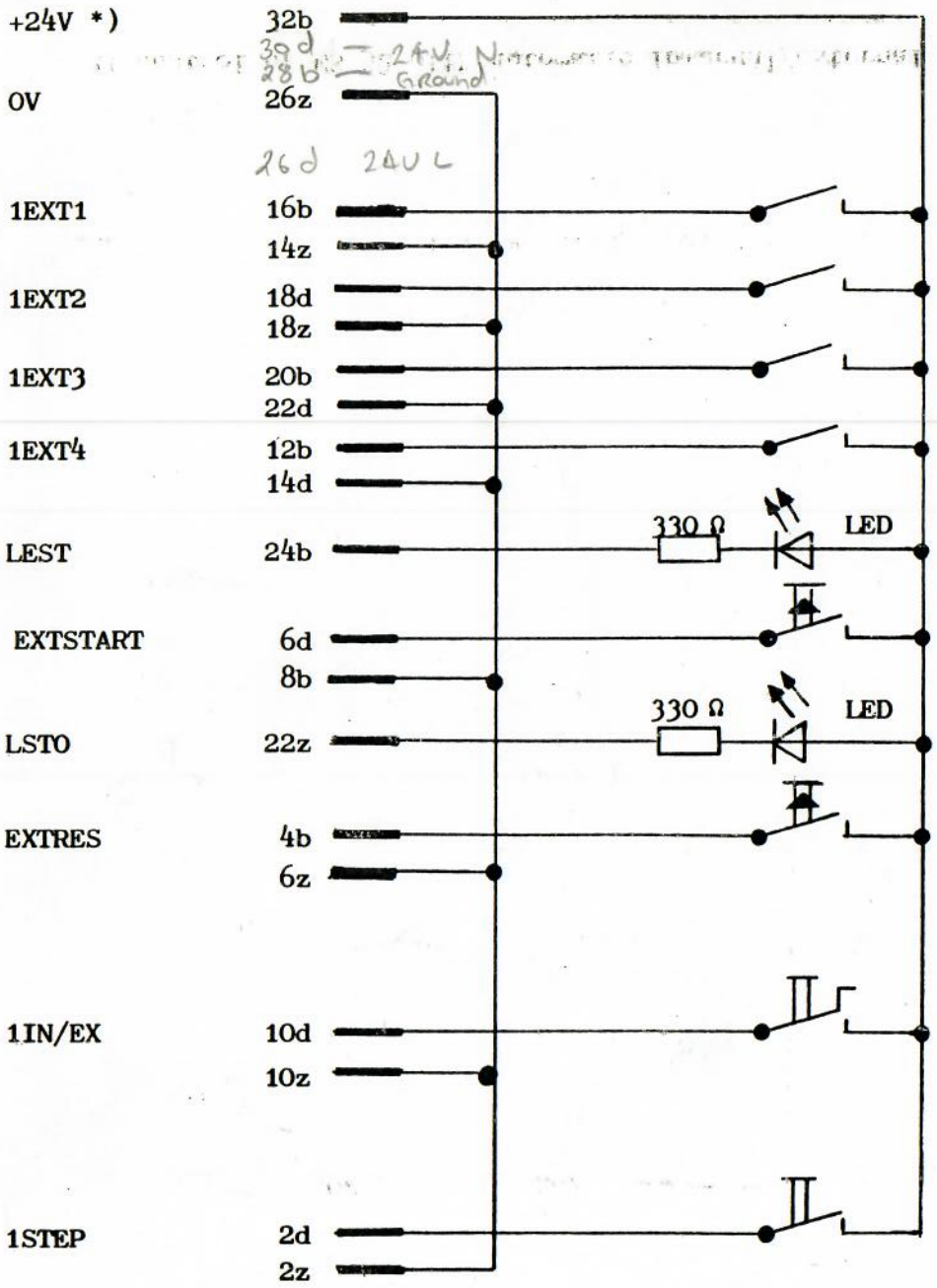
Activating this input (impulse duration $\geq$100ms) causes the ES 32 to switch to the next program step. This step function is independent of the operating mode (internal or external control). In addition, the switching step may be continued at any time i.e. also during a timed step or stop function.

With the program step function it is possible to step through a program, step for step until the program end. The programmed outputs are activated for the individual steps.

7.1.6 Power supply for external control

In the event that no external voltage is available the input cards may be fed directly from the internal 24V of the ES 32 available on the pin contacts of the SVG card (32b (+24V), 26z (0V).

Please note, this voltage may only be used for the external control inputs (see point 10.2 Installation information).



Program selection 1 - 16

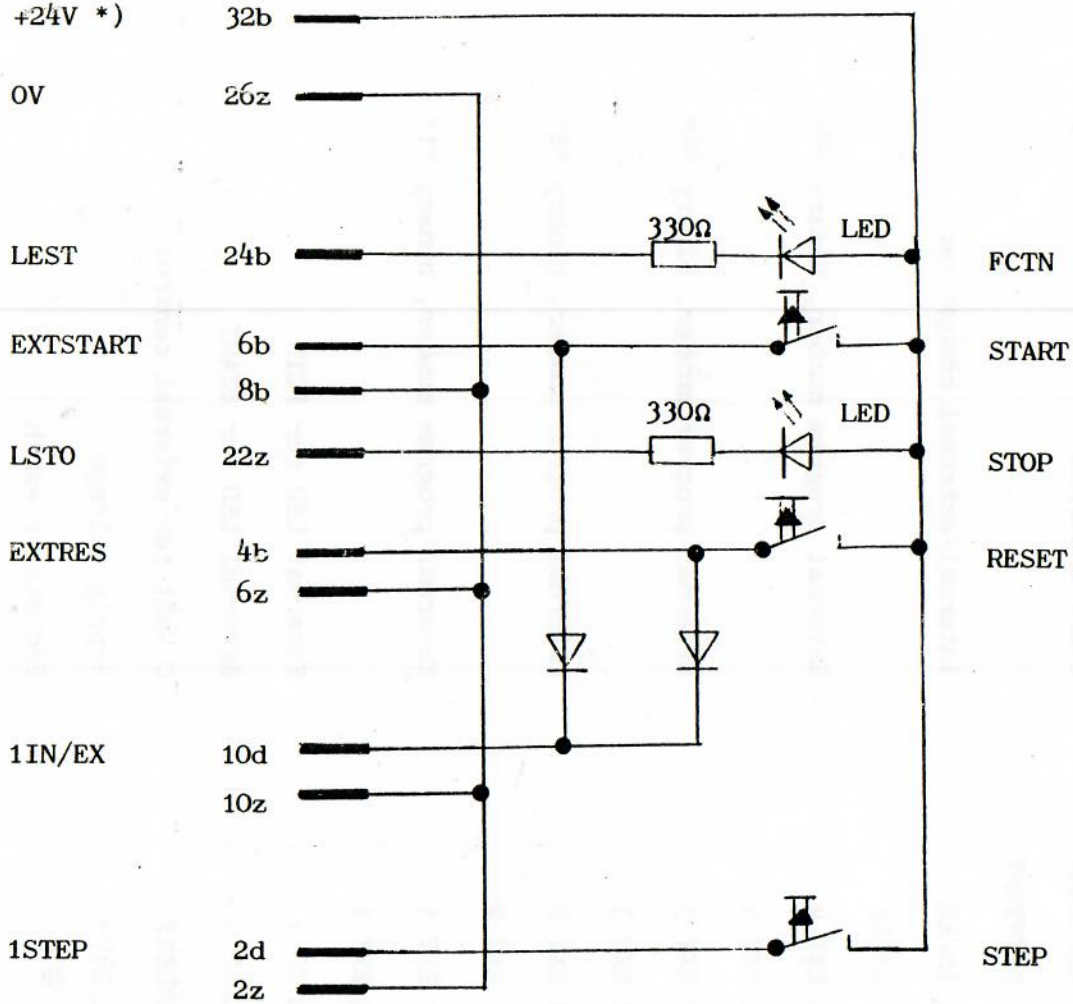
Truth table

Prog. no. ext.	Prog. no. int.	Validity 1	2	4	8
1	1	0	0	0	0
2	2	1	0	0	0
3	3	0	1	0	0
4	4	1	1	0	0
5	1A	0	0	1	0
6	2A	1	0	1	0
7	3A	0	1	1	0
8	4A	1	1	1	0
9	1B	0	0	0	1
10	2B	1	0	0	1
11	3B	0	1	0	1
12	4B	1	1	0	1
13	1AB	0	0	1	1
14	2AB	1	0	1	1
15	3AB	0	1	1	1
16	4AB	1	1	1	1

1 = Contact closed
0 = Contact open

*) When using the internal +24V voltage pay attention to the installation instructions (10.2)

External control of ES 32



*) When using the internal +24V voltage pay attention to the installation instructions (10.2)

External control of ES 32 with automatic internal/external changeover (without program selection).

8. PIN ARRANGEMENT SVG (Power supply)

Pin contact	Signal	Comment
2d	1 STEP	Step-relaying external
2z	1 STEP	
4b	1 EXTRES	Reset external
6z	1 EXTRES	
6d	1 EXTSTART	Start external
8b	1 EXTSTART	
10d	1 IN/EX	Internal/external changeover
10z	1 IN/EX	
12b	1 EXT 4	External program number, binary "8"
14d	1 EXT 4	
20b	1 EXT 3	External program number, binary "4"
22b	1 EXT 3	
18d	1 EXT 2	External program number, binary "2"
18z	1 EXT 2	
16b	1 EXT 1	External program number, binary "1"
14z	1 EXT 1	
22z	LSTO	External LED for FCTN
24b	LEST	External LED for START
26z	GNDEXT	0 Volt for external control
26d	L_1 24V~	Supply voltage
28b	⏚	Protective earth
30d	N 24V~	Supply voltage
30z		
32b	UEXT	+24V for external control (see point 10.2 Installation information)

8. PIN ARRANGEMENT RAK (Relay output card)

Pin contact	Channel	Comment
2z	1	Normally open contact (NO)
4b	1	Common contact (C)
6z	2	Normally open contact (NO)
6d	2	Normally closed contact (NC)
8b	2	Common contact (C)
10z	3	Normally open contact (NO)
12b	3	Common contact (C)
14z	4	Normally open contact (NO)
14d	4	Normally closed contact (NC)
16b	4	Common contact (C)
18z	5	Normally open contact (NO)
18d	5	Normally closed contact (NC)
20b	5	Common contact (C)
22z	6	Normally open contact (NO)
22d	6	Normally closed contact (NC)
24b	6	Common contact (C)
26z	7	Normally open contact (NO)
28b	7	Common contact (C)
30z	8	Normally open contact (NO)
30d	8	Normally closed contact (NC)
32b	8	Common contact (C)

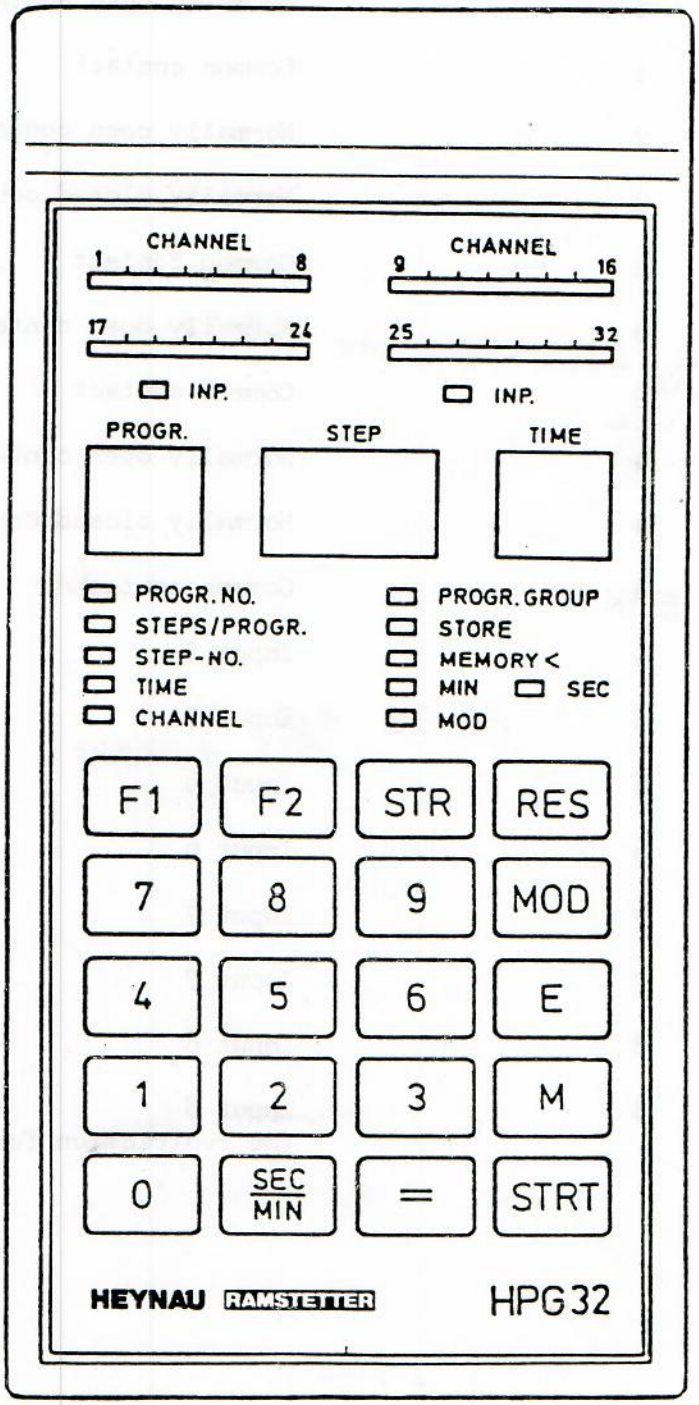
8. PIN ARRANGEMENT DEK (Digital input card)

Pin contact	Channel	Comment
2d	1	No restriction for polarity of inputs
2z	1	
6d	2	
6z	2	
10d	3	
10z	3	
14d	4	
14z	4	
18d	5	
18z	5	
22d	6	
22z	6	
26d	7	
26z	7	
30d	8	
30z	8	

8. PIN ARRANGEMENT EAK (4 inputs - 4 relay outputs)

Pin contact	Channel	Comment	
2z	1	Normally open contact	(NO)
4b	1	Common contact	(C)
6z	2	Normally open contact	(NO)
6d	2	Normally closed contact	(NC)
8b	2	Common contact	(C)
10z	3	Normally open contact	(NO)
12b	3	Common contact	(C)
14z	4	Normally open contact	(NO)
14d	4	Normally closed contact	(NC)
16b	4	Common contact	(C)
18d	5	Input 5	
18z	5	Input 5	
22d	6	Input 6	
22z	6	Input 6	
26d	7	Input 7	
26z	7	Input 7	
30d	8	Input 8	
30z	8	Input 8	

(No restriction for polarity of inputs)



Programming Unit HPG 32

9. Programming

The HPG 32 portable programming unit serves to program the ES 32. It is used for programming, program modification and for service procedures.

It is not required for the stand alone operation of the ES 32.

The programming unit comprises a display field and input keyboard. The program number, step number and step time appear as decimal digits in the 7 segment display. The input and output channel as well as the programmed function are indicated with LEDs.

The input keyboard comprises 10 numerical keys (digits 0 - 9) and 10 function keys. The programmer is provided with an inbuilt audible signal that sounds with every operation of the programming keys. That is to say with each operation of a programming key a brief whistle tone is heard so as to advice the programmer a key has been pressed and a command entered.

9.1 Description of the indicating and operating elements of the HPG 32

9.1.1 Indicators

Indicator:	Description:
LEDs Channel 1-32	Indicator for the programmed input/output channel. The programmed input of a channel requires 2 digits.
LEDs Inp.	If the unit to be programmed is fitted with input cards, then these inputs will be assigned to the "Input" LEDs, representing the channels 17 - 24 and 25 - 32.
Program	Indication for the given program number as well as the program group number (2 digit)
Step	Display for the given step number and number of steps (3 digit)
Time	Display for the given step time in seconds or minutes (2 digit)
LED Program no.	Input program number (1 - 16)
LED Steps/Program	Input for the number of steps in a program
LED Step-number	Input for the step no. of a program
LED Time	Input for the step time of a program step. The time may be programmed in either minutes or seconds (see LEDs MIN/SEC)
LED Channel	Input for input/output channel

LED Program group	Input of an assigned code number from 1 to 99 for a program group comprised of max. 16 individual programs.
LED Store	The LED lights up for the duration of a store procedure.
LED Memory <	LED blinks when the number of steps in a program exceeds the available free space in the working memory.
LED MIN/SEC	Input for the step time in minutes or seconds. The indication MIN or SEC is displayed with the LED Time.
LED Modify	Modifying and checking a program.

9.1.2 Keyboard

Key:	Comments:
STR (Store)	The program stored in the programming unit is loaded and stored into the working memory of the ES 32.
RES (Reset)	Voids an input. The current input is cleared.
MOD (Modify)	Modifies and checks a program. Individual program steps can be checked and modified after depressing the "MOD" key.
E (END)	Depression of the "E" key terminates the current program. A request for the number of the next program follows.
M (Mode)	The mode key serves to select the required function. The following functions are available: Program number, Steps/Program, Step number, Time, Channel, Program group
STRT (Start)	The program currently in the ES 32 is loaded into the memory of the programming unit. The program may be then checked, modified or loaded into another unit (duplicated).
"=" (Accept)	Depressing of the "=" key causes the current entered function to be stored and then switch to the next function. In addition the program can be displayed step by step when the function "Modify" is active.

Note!

If the "=" key is depressed when the unit is in the programming mode (function "modify" deactivated) without a current entered line, then the selected program value will be overwritten with a 0 value.

SEC/MIN (Selection)	Selection of times to be programmed as either minutes or seconds. Used with the function "Time".
0 - 9	The 10 numerical keys are used for entering data for the following functions: - Program number - Steps/Program - Step number - Time - Channel - Program group It should be kept in mind, that channel number is always a 2 digit number. Example for channel 1: enter: 01
F1 (cycle)	The function key F1 serves to program the automatic repeat of a complete program. In case an established program is terminated by means of pressing key F1 instead of pressing the key "E" (for end), a return of the complete program to the first step of program is effected after processing, and the selected program is operated once again. The cycle operation can only be interrupted by re-setting the program.
F2	By means of the actuation of key F2 the programming unit is reset to the starting condition (program number is requested).

9.2 Using the programming unit

No specialized programming knowledge is necessary for operating the programming unit. The function keys are colour coded to present a simple and logical arrangement. For establishing programs a programming example is available which guarantees a clear documentation of a program.

Programming is accomplished step by step. Each programmed step is a combination of:

- Step number

- Step time (minutes or seconds)

- Input and output channels (according to version)
  (Input channels are processed as logical AND combinations).

The programming of the individual functions within a program step is by means of an operator guide (Dialog) i.e., the functions within a program step are displayed and programmed in the sequence, Step number, Time, Channel. After the input and acceptance of the input/output channel the unit then advances to the next program step. This programming cycle can be excited with the "M" key (Mode). This may be necessary e.g. when modifying or checking parts of programs.

Depressing the "MOD" key changes over from programming to "Modify" mode. A completed program is cleared by depressing the "E" key (End). The loading of the program from the programming unit into the working memory of the ES 32 is achieved by depressing the STR key (Store). The program image is retained in the programming unit. If other ES 32s are to be loaded with the same program all that is required is to plug in the programming unit. The integrated battery serves to retain the data after the programming unit is removed from the ES 32. Details of programming are elucidated in the following programming example.

9.3 PROGRAMMING EXAMPLE

NO.	ENTER	INDICATION PROG.	STEP	TIME	LEDs	COMMENTS
1	Plug in the programming unit				Progr. No. Modify	- Enter a program number
2	MOD				Progr. No.	- Changeover from modify to programming
3	1 =	01			Steps/Progr.	- Request to enter the number of steps
4	6	01	006		Steps/Progr.	- Enter number of steps
5	=	01	001		Time Sec	- Request to enter time
6	1 0 =	01	001	10	Channel	- Request to enter the I/O Channels - Time displayed
7	0 3	01	001	10	Channel Channel 3	- Enter the output channel 3 - Display channel 3
8	0 5	01	001	10	Channel Channel 5	- Enter the output channel 5 - Display channel 5
9	=	01	002	00	Time	- Step 1 is stored - Request to enter time
10	=	01	002	00	Channel	- Request to enter the I/O channels - Display time

NO.	ENTER	INDICATION				COMMENTS
11	0 7	01	002	00	Channel Channel 7	- Enter output channel 7 - Display channel 7
12	1 8	01	002	00	Channel Channel 18	- Enter the input channel 18 - Display channel 18
13	2 1	01	002	00	Channel Channel 21	- Enter the input channel 21 - Display channel 21
14	=	01	003	00	Time SEC	- Step 2 is stored - Request to enter time
15	3 0 =	01	003	30	Channel	- Request to enter the I/O channels - Display time
16	0 3	01	003	30	Channel Channel 3	- Enter output channel 3 - Display channel 3
17	1 2	01	003	30	Channel Channel 12	- Enter output channel 12 - Display channel 12
18	=	01	004	00	Time SEC	- Step 3 is stored - Request to enter time
19	SEC/MIN	01	004	00	Time	- Changeover SEC --> MIN
20	0 1 =	01	004	01	Channel	- Request to enter the I/O channels - Display time
21	0 4	01	004	01	Channel Channel 4	- Enter output channel 4 - Display channel 4
22	0 6	01	004	01	Channel 6	- Enter output channel 6 - Display channel 6

NO.	ENTER	INDICATION				COMMENTS
23	=	01	005	00	Time MIN	- Step 4 is stored - Request to enter time
24	SEC MIN	01	005	00	Time SEC	- Changeover MIN --→ SEC
25	2 0 =	01	005	20	Channel	- Request to enter the I/O channels - Display time
26	0 4	01	005	20	Channel Channel 4	- Enter output channel 4 - Display channel 4
27	0 6	01	005	20	Channel Channel 6	- Enter output channel 6 - Display channel 6
28	=	01	006	00	Time SEC	- Step 5 is stored - Request to enter time
29	E				Progr. no. Modify	- Processing of the program no. 1 is finis Request for no. of the next program is i
30	STR				Store (1 sec.) Modify	- Finished program is loaded into ES 32.

Step no.	Step time min	Step time sec	Output 1–8	Output 9–16	Output 17–24	Output 25–32
1		10	3, 5			
2	–	–	6		18, 21	
3		30	3	12		
4	1	–	4, 6			
5		20	4, 6			
6	–	–		10	17, 19	
7						
8						
9						
0			1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
1						
2						
3						
4						
5						
6						
7						
8						
9						
0			1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
1						
2						
3						
4						
5						
6						
7						
8						
9						
0			1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
1						
2						
3						
4						
5						
6						
7						
8						
9						
0			1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
1						
2						
3						
4						
5						
6						
7						
8						
9						
0			1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32

Prog. no. correlation

HPG32	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ES32	1	2	3	4	1A	2A	3A	4A	1B	2B	3B	4B	1AB	2AB	3AB	4AB

	Connector 2	Connector 3	Connector 4	Connector 5
	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32

Type

	Date	Name
Drawn		
Approved		

HEYNAU RAMSTETTER

ES32-PVL3

Program application

Program designation

Program no. 1

HPG32

ES32

Ind.	Revisions	Date	Name

9.3.1 Program verification

The programming unit HPG 32 commands for verification and correction of the program in the working memory of the ES 32.

The checking or correction of a program (or part thereof) is as follows:

1. Plug programming unit ES 32

2. Depress "STRT" key.
   With this command the contents of the ES 32 memory (max. 16 programs) is loaded into the programming unit. LED "MOD" lights up.

3. Enter the program no. of the program to be reviewed.

4. Enter the step number from which the review is to begin.

5. Successive pressing of the "=" key steps through the program until the statement to be reviewed appears in the display.

   Modification of a program in this operating mode may also be carried out. The value to be corrected is annulled with the "RES" (Reset) function and then replaced with a new value.

   These possibilities for correction and review are also available during the programming phase.

   Using the "MOD" (modify) key, the programming unit may be operated in this mode. After correction or review of a program the "MOD" key is again depressed and the programming unit returns to the programming mode.

   After completion of correction or review of a program depressing the "STR" (Store) key loads the program into working memory of the ES 32.

9.3.2 Duplicating programs

A finished program may be loaded into any ES 32 using the programming unit.

There are 2 possible ways to duplicate a program:

1. A program is written with the programming unit and then loaded into the individual ES 32's (STR key),
   or

2. the program is loaded from one ES 32 into the programming unit (STRT key) and then loaded into another ES 32 (STR key).

9.3.3 Program identification

A program written for the ES 32 (comprised of max. 16 individual programs) can be identified with a code number. This feature offers a possibility of up to 99 different, complete programs to be clearly assigned to program groups. The code no. may be entered at any time. In the operating modes "Modify" or "Programming" the function "Prog. group" may be selected by depressing the "M" key. The selected code no. is then entered and the statement "Progr." appears in the display. The "=" key is then depressed which causes the code no. to be stored in the memory of the programming unit. If an existing program is to be assigned a code no., then the program is loaded into the programming unit using the "STRT" key, the code no. is entered following which the "STR" key is depressed and the program is loaded back into the ES 32. A call to this code number is possible at any time by selecting the function "Prog. group" with the "M" key.

9.3.4 Recognition of the input/output card configuration

The ES 32 basic version is fitted with 2 output cards (16 outputs). I/O expansion cards may be retrofitted to reconfigure the unit to one of the available versions as listed in the front of this document. When input cards are present there is an additional indication, "INP", of LEDs assigned to each of the channels 17 - 24 and 25 - 32.

The ES 32 can be expanded with the addition of plug-in cards up to the max. expansion steps available of 32 I/O channels.
The following cards are applicable

DEK: Digital input card (8 inputs)

RAK: Relay output card (8 outputs)

EAK: Input/output card (4 inputs, 4 outputs)

The unit adjusts itself automatically on changing of the arrangement of the 32 I/O channels.

In additon the following should be noted:

1) The RA-card is always plugged into slot 2 or 3.

2) Other cards will always be plugged into slot 3.
The following installation sequence should be adhered to:
RAK ⟶ DEK, resp. RAK ⟶ EAK, resp. RAK ⟶ EAK ⟶ DEK.

3) Only one EA-card (EAK) per unit can be used.

Note: After an assembly modification a program written for another I/O card will not run. The program must be re-written for the new configuration.

9.3.5 Programming step times

Step times, within a program step, may be programmed in minutes or seconds. If a step time is required which is a combination of minutes and seconds, this can be programmed by using a second step with the same programmed inputs and outputs and the step timed in seconds.

Example: Channels 4 and 6 are to be switched on for 1 minute and 20 seconds (see also "Programming example")

Step no.	Step time	Channel
4	1 min.	4 + 6
5	20 secs.	4 + 6

In many instances it is required that the next step to be carried out is initiated either by a programmed step time or via a process signal.

For ES 32's fitted with input cards this function is possible. By programming a step time (as a monitoring time for a function) as well as the respective input signal, that next step in the program may be initiaited either by the elapsed step time or an input signal (within the programmed step time).

If a step is programmed with the step time 0 without an input channel, then the step time has no limits. Initiating the next program step is only possible with the external control function "Step" (see external control inputs).

9.3.6 Step number programming (variable program extension)

The possibility of step number programming offers a optimum loading of the user memory as well as a variable program extension of the individual program.

9.3.6.1 Establishing of a program

Program installation is effected in the operation mode programming (LED "MODIFY" is switched off).
After entering the program number the entering of the step number will be requested. The LED "STEPS/PROGR" lights up.

If the entered step number is too large the LED "MEMORY < "lights up. After pressing of the "RES" key a new smaller step number can be entered. Following entry of the last step number of the program either the "E" or "F1" must be pressed. Should the user forget, "E" will be automatically entered and memorized and the program application discontinued (otherwise the start of the following program would be over-written).
When no program number is entered the first program step with the end marked "E" is recorded.

9.3.6.2 Modifying a program

Plug the HPG 32 into the ES 32. Press "STRT" key. Program modifications will be carried out in operation mode "Modify" (LED "MOD" is on). By pressing the "STRT" key the memory in the HPG 32 is reorganized, that is the programs will be transfered from the ES 32 to the HPG 32 and will remain there in uninterrupted sequence. The remaining free memory locations will then be found following the last (16.) program entered.

- Programs can be shortened or completely erased.

- Programs can be extended.

  The new extended program can be entered in the operation mode "Programming". The complete program however need not be re-written, but instead "Modify" is selected. The existing program steps can be examined and the new ones given. The previously registered "E" is cancelled by pressing "RES".

Attention: After entering the step number of a program the command "E" will be automatically entered in the last step number of the program. Additional "E" commands within a program are not permissible and must be cancelled.

When a program is shortened, the freely available (newly gained) memory space will be first considered following the next entering of "STRT". (Loads the program contents of the ES 32 into the programming unit HPG 32). In the case of extensive programming modifications eventually a re-organization of the user memory may be required. This can now be carried out as follows: Press the key "SP" on the HPG 32. (The program will then be transfered from the HPG 32 to the ES 32). Now press the "STRT" key. The HPG 32's remaining free memory space is now again ready to be utilized.

9.3.6.3 Available program steps

The available program steps can be freely divided into as many as 16 programs. The total number of steps available depends of the particular model of the equipment.

The different models available are as follows:

2 E/A	3 E/A	4 E/A	Card
1261	948	761	Steps

9.3.6.4 Storing new configuration

In the following cases it may be necessary to completely re-configure the user memory:

When equipment is being installed for the first time. After accidental partial loss of the memory. After changing battery in HPG 32 etc. ...Therefore a program is available in event of the above and will begin upon:

The hand-held programming unit HPG 32 being plugged into the ES 32, and the "RES" key being pressed for a few seconds.

Following this, all programs in the HPG 32 will be cancelled. The program-group-number will be set on 99 following a successful new configuration.

10. INSTALLATION GUIDELINES

10.1 Voltage supply connection

The ES 32 is principally a 24V A.C. device. The network frequency may be either 50Hz or 60Hz. The device requires its own transformer with galvanically isolated windings and an additional protection winding between the primary and secondary sides, which is to be earthed. The voltage supply should remain within the tolerance +10 and -20%.

To ensure an interference free voltage supply, other loads should not be connected to this voltage supply.

The max. current drain for a fully expanded unit is approx. 35VA.

10.2 External wiring of the ES 32

The following recommendations are given to ensure an interference free operation of the unit. Following these recommendations will guarantee that the unit carries out its task in an efficient, trouble free way and is protected against interferences which commonly occur in practice.

- Earthing the unit

The ES 32 is enclosed in a sheet steel housing which is fitted with an earthing terminal at the rear, to the left. The earthing terminal is connected to protective earth using a suitable tab connector. In addition the power supply card SVG is fitted with an earthing connection (pin contact 28b) which also must be connected to protective earth.

The min. cross sectional area of the earthing wire must be observed (2.5mm).

- Wiring up

The relay output cables should be laid separately to the input cables. In addition, the output and input cables should be laid as far as possible away from power cables. When using screened cables the screen should only be connected on one end with the potential voltage the other end must remain free.

- A.C. loads

Switching of contactor coils etc. produce over voltage spikes. These may be limited as follows:

For damping of over voltage spikes various components or component combinations switched in parallel with the load are suitable, e.g. resistances, varistors, capacitors, capacitors and resistances in series.

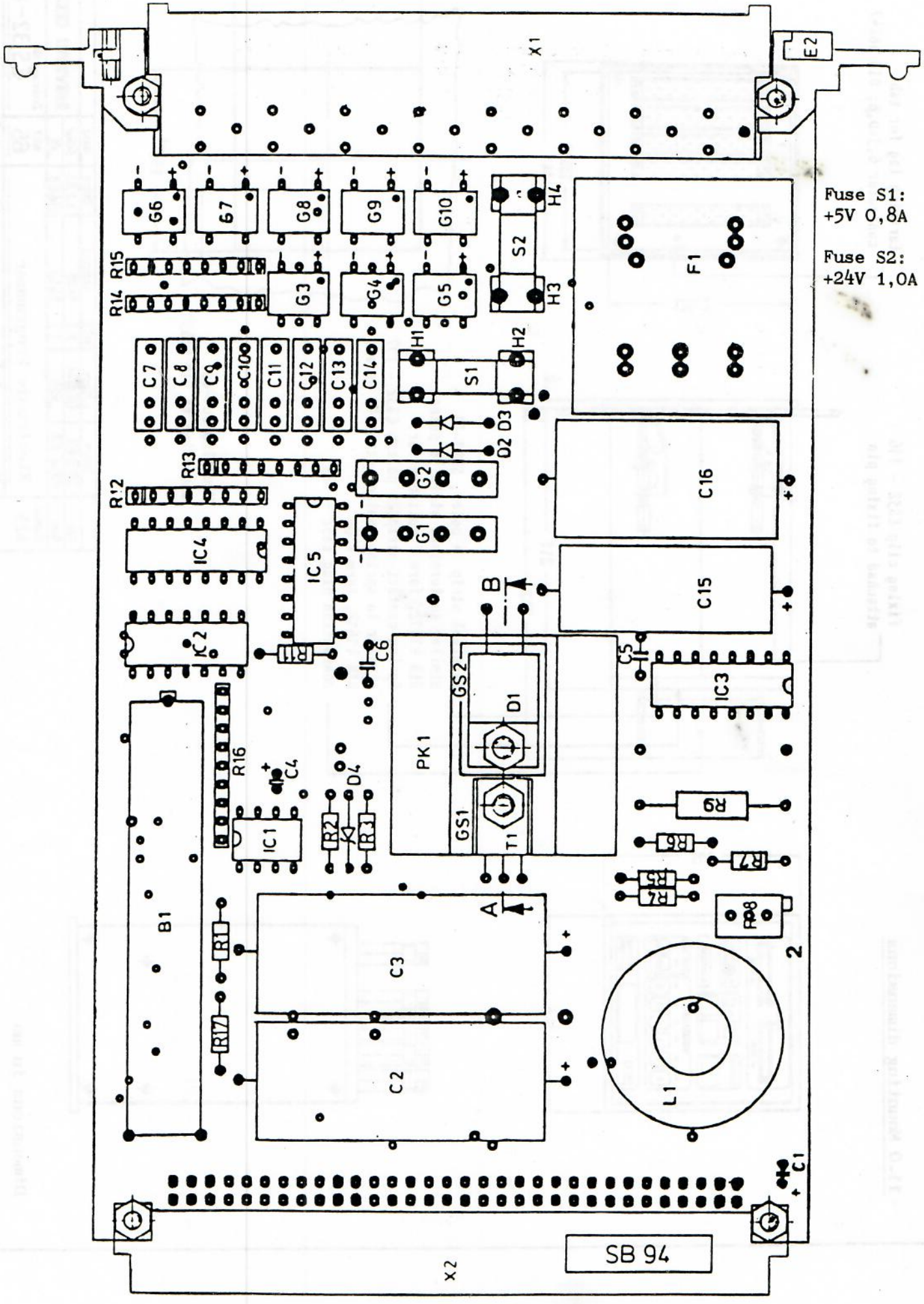
The most economical solution is the switching in of RC elements which are available, matched, for almost every type of contactor. When switching the relay output contacts it should be ensured that all contacts are connected to the same phase.

- D.C. loads

Inductive D.C. loads must be switched with a flywheel diode.

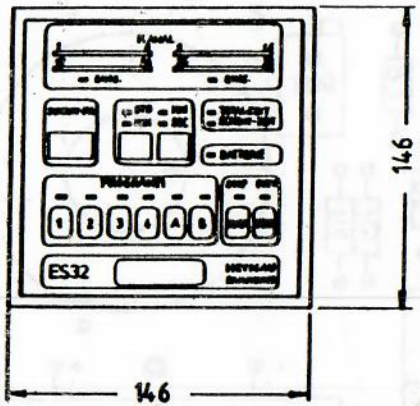
10.3 Voltage failure

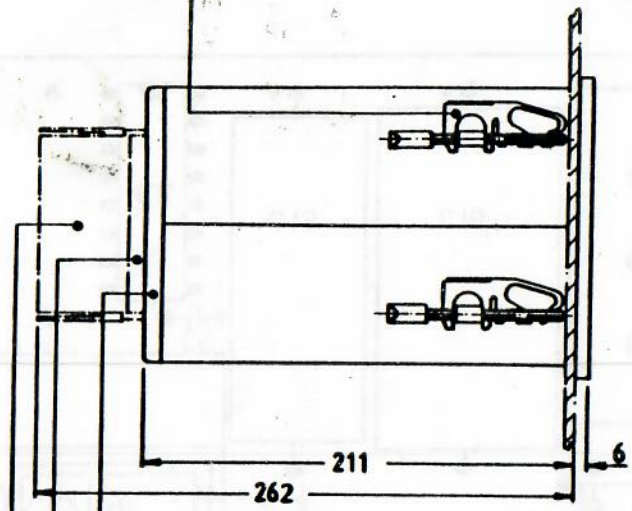
When voltage fails, the current program as well as the current step no. and step time are stored. On return of supply the program is continued from that point at which the voltage failed. The outputs of the ES 32 are active.

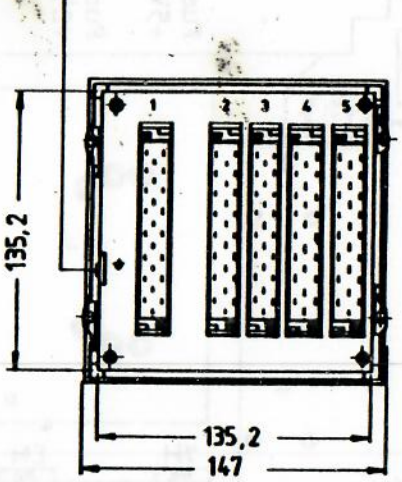


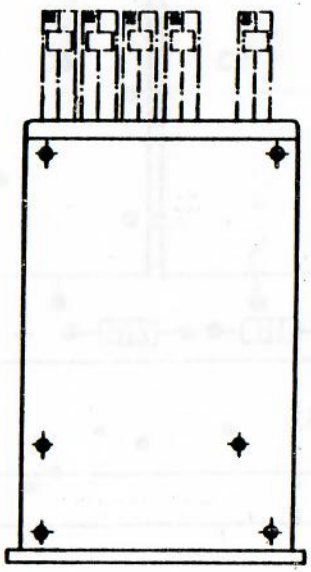
SVG Power-Supply-Card - Position of Fuses S1 and S2

11.0 Mounting dimensions

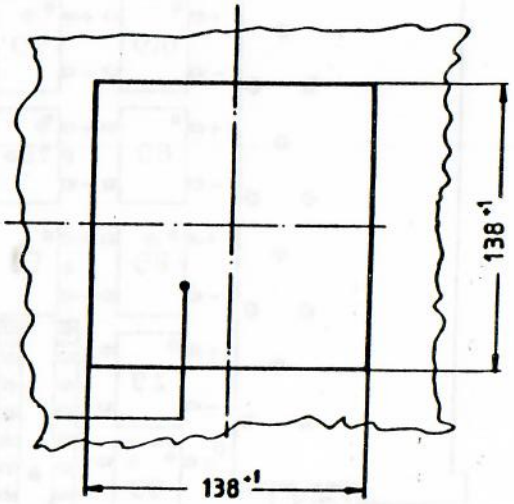








Terminal strip 24 poles, SB91-T1
similar to terminal strip 48 poles,
DIN 41612, form F suitable for:
Spring contact-strip 24 poles, ES32 - T17
similar to spring contact-strip 48 poles,
DIN 41612, form F or
connection plug ES32 - TZ4



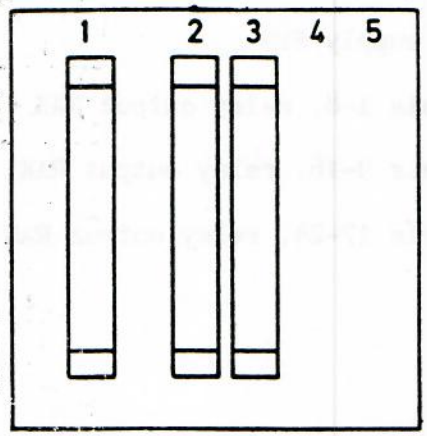
Mounting cut-out
according to DIN 43831

Dimensions in mm

	Datum	Name	Ind.	Änderung	Datum	Name	
Gez.	29.3.83		2	1458	3.2.84		HEYNAU RAMSTEIN
Gepr.	15.6.83		1	1418	15.6.83		
Maßstab 1:2,5	Electronic Programmer					WKZ 65	Zeichnungs Nr. ES 32-M1
	Abt.:	Ers. F.:		Ind.		Ers. D.:	Ind.

Arrangement of the connection plugs

Version ES 32-20
16 Outputs

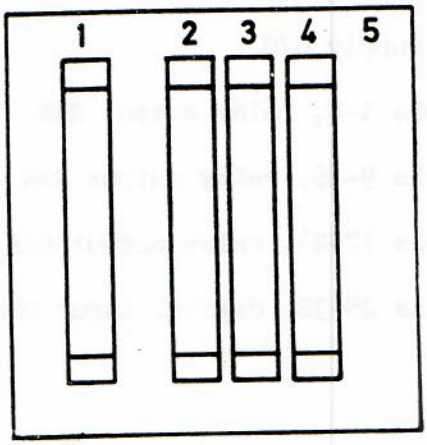


1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

3 = Connection, channels 9-16, relay output RAK

Version ES 32-21
16 Outputs, 8 inputs



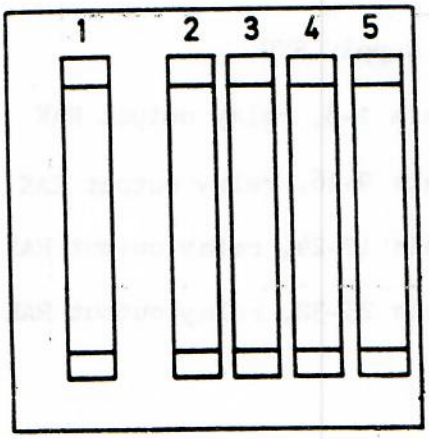
1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

3 = Connection, channels 9-16, relay output RAK

4 = Connection, channels 17-24, digital input DEK

Version ES 32-22
16 Outputs, 16 inputs



1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

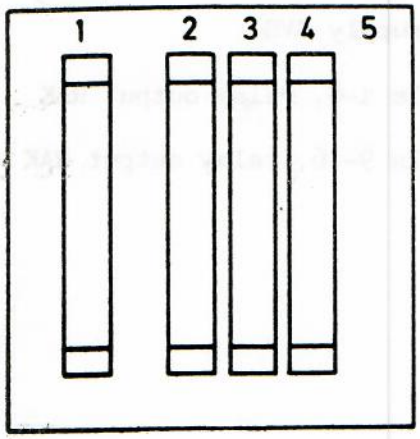
3 = Connection, channels 9-16, relay output RAK

4 = Connection, channels 17-24, digital input DEK

5 = Connection, channels 25-32, digital input DEK

Arrangement of the connection plugs

Version ES 32-30
24 Outputs



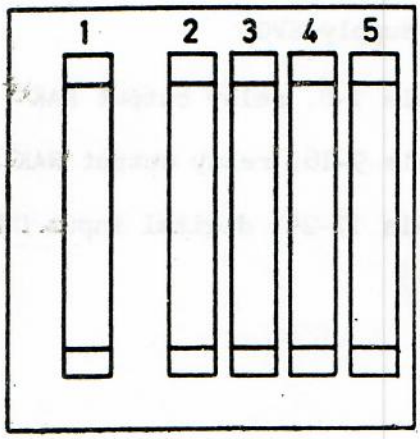
1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

3 = Connection, channels 9-16, relay output RAK

4 = Connection, channels 17-24, relay output RAK

Version ES 32-31
24 Outputs, 8 inputs



1 = Connection, power supply SVG

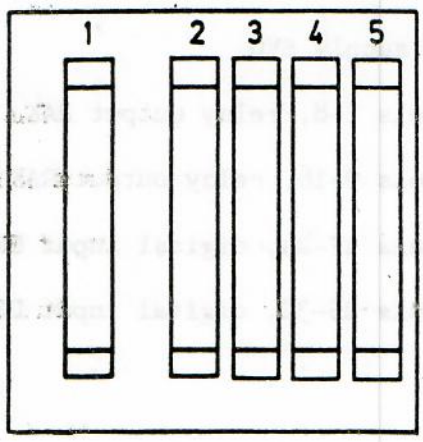
2 = Connection, channels 1-8, relay output RAK

3 = Connection, channels 9-16, relay output RAK

4 = Connection, channels 17-24, relay output RAK

5 = Connection, channels 25-32, digital input DEK

Version ES 32-40
32 Outputs



1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

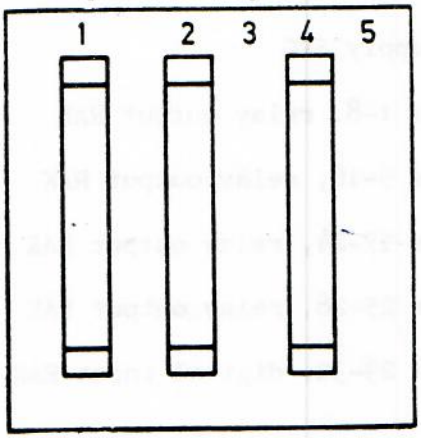
3 = Connection, channels 9-16, relay output RAK

4 = Connection, channels 17-24, relay output RAK

5 = Connection, channels 25-32, relay output RAK

Arrangement of the connection plugs

Version ES 32-11
8 Outputs, 8 inputs

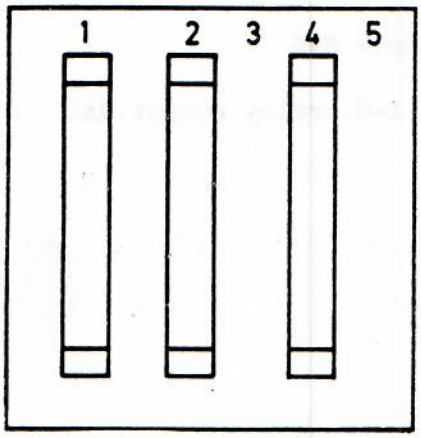


1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

4 = Connection, channels 17-24, digital input DEK

Version ES 32-110
12 Outputs, 4 inputs



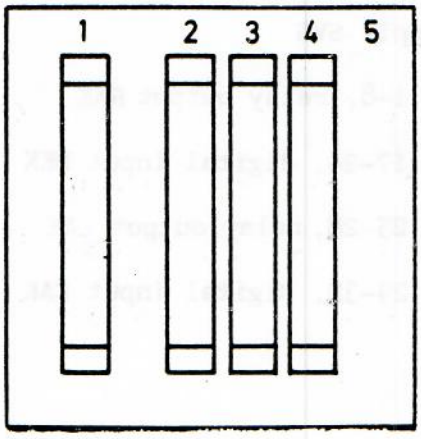
1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

4 = Connection, channels 17-20, relay output EAK

4 = Connection, channels 21-24, digital input EAK

Version ES 32-120
20 Outputs, 4 inputs



1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

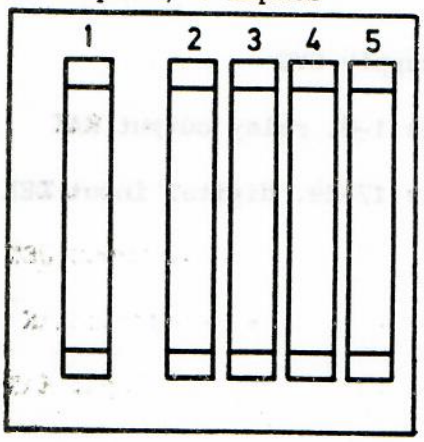
3 = Connection, channels 9-16, relay output RAK

4 = Connection, channels 17-20, relay output EAK

4 = Connection, channels 21-24, digital input EAK

Arrangement of the connection plugs

Version ES 32-130
28 Outputs, 4 inputs



1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

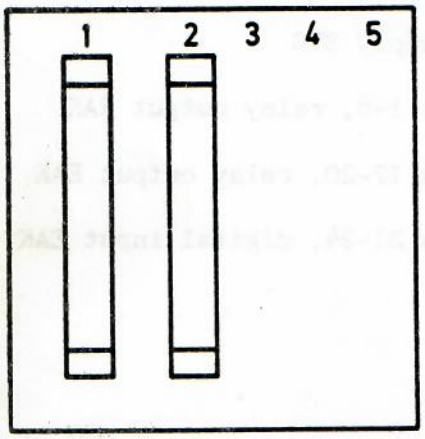
3 = Connection, channels 9-16, relay output RAK

4 = Connection, channels 17-24, relay output RAK

5 = Connection, channels 25-28, relay output EAK

5 = Connection, channels 29-32, digital input EAK

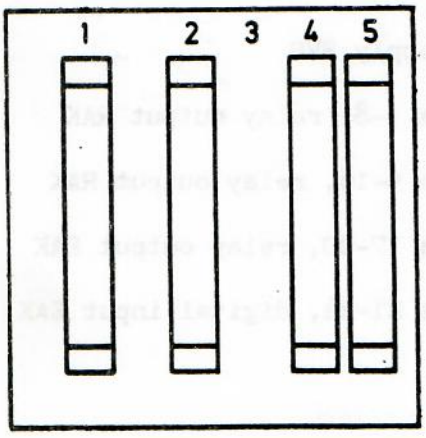
Version ES 32-10
8 Outputs



1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

Version ES 32-111
12 Outputs, 12 inputs



1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

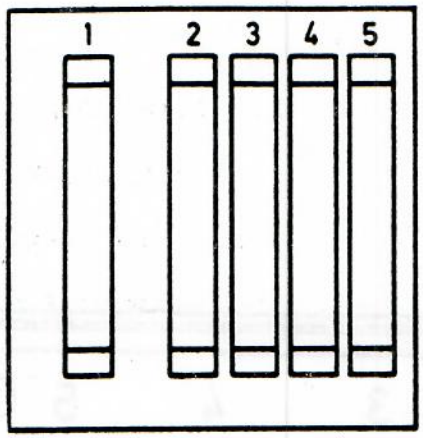
4 = Connection, channels 17-24, digital input DEK

5 = Connection, channels 25-28, relay output EAK

5 = Connection, channels 29-32, digital input EAK

Arrangement of the connection plugs

Version ES 32-121
20 Outputs, 12 inputs



1 = Connection, power supply SVG

2 = Connection, channels 1-8, relay output RAK

3 = Connection, channels 9-16, relay output RAK

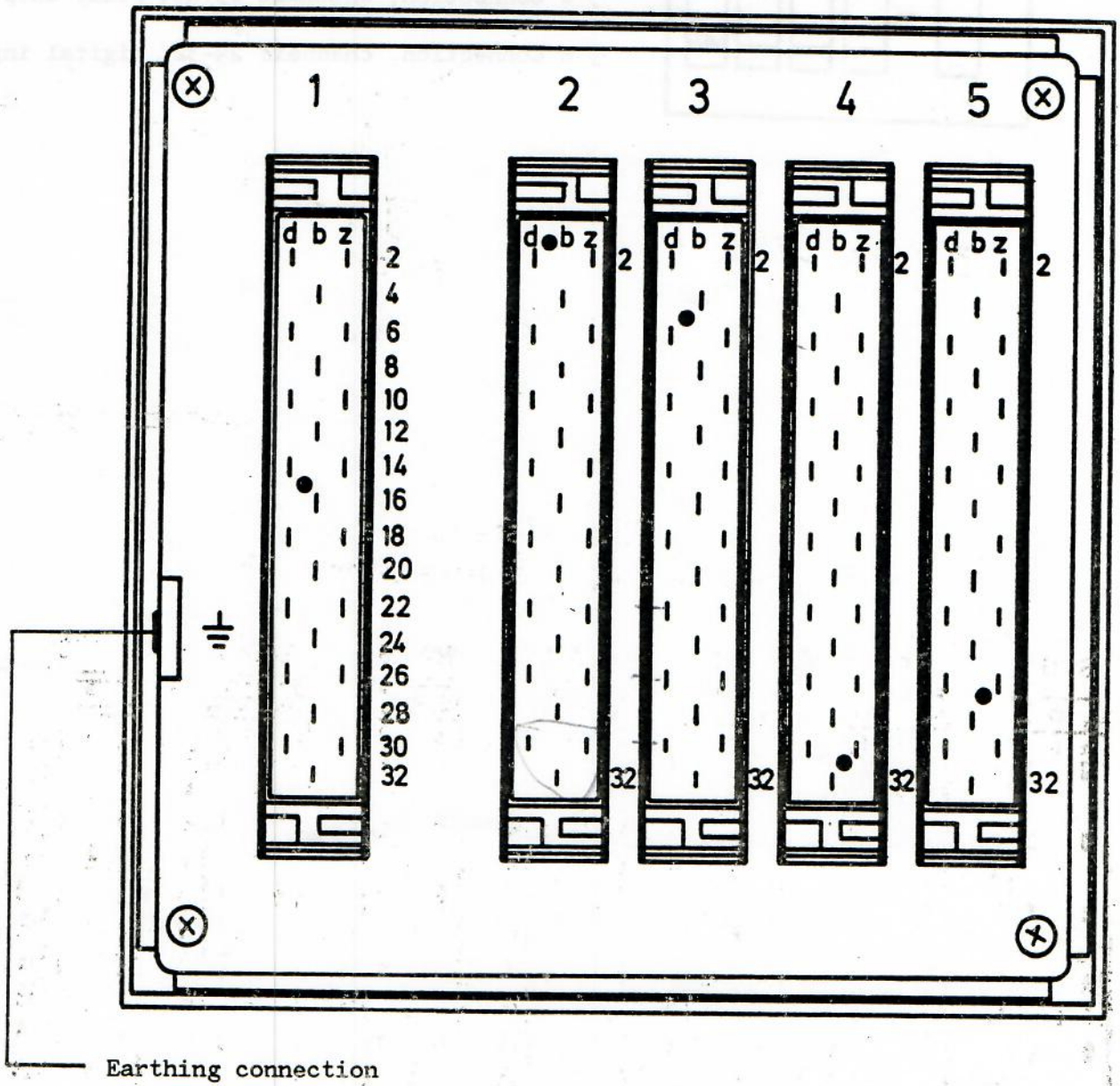
4 = Connection, channels 17-24, digital input DEK

5 = Connection, channels 25-28, relay output EAK

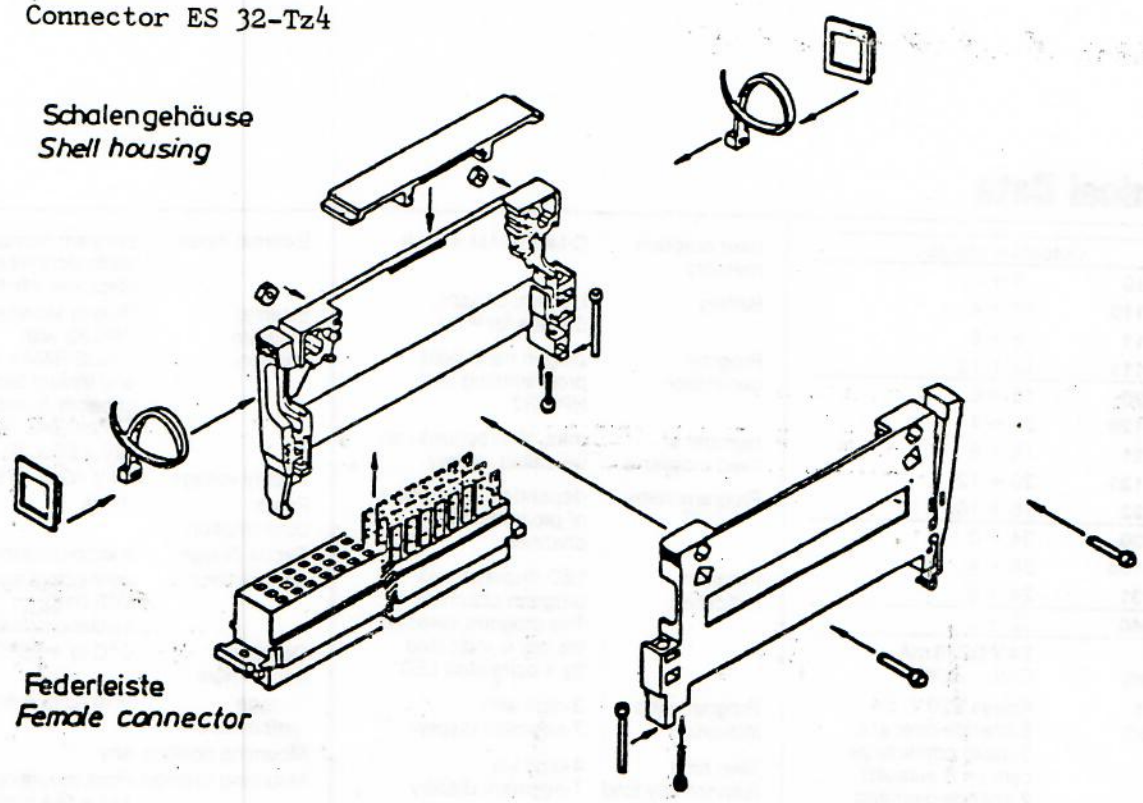
5 = Connection, channels 29-32, digital input EAK

Arrangement of the connection plugs

Position of the plug contacts

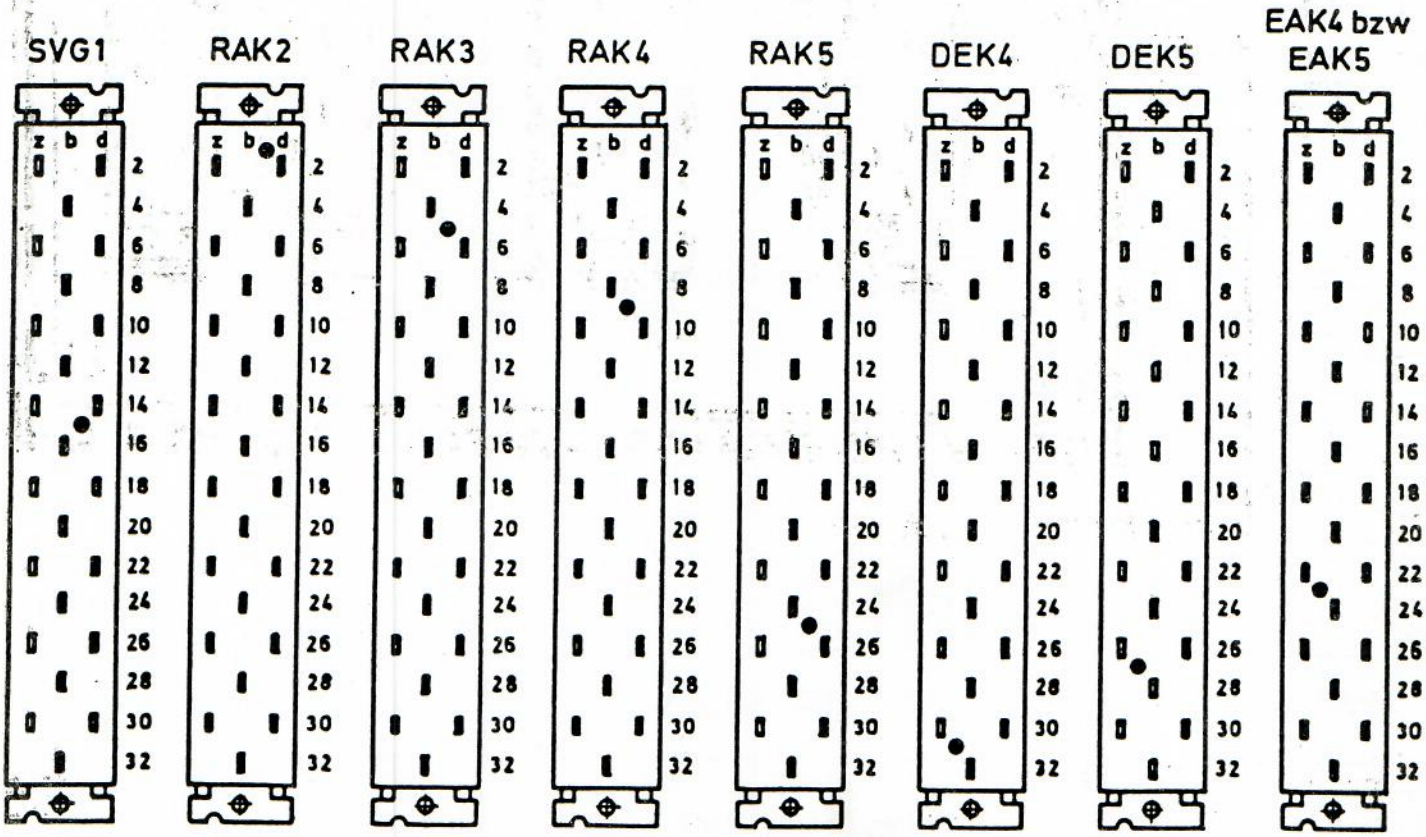


Connector ES 32-Tz4



Codierteil
Code pin

Federleistencodierung
Coding of female connector



Connector-mounting ES 32-EB2

Technical Data

Type	Outputs + Inputs
ES 32-10	8 + 0
ES 32-110	12 + 4
ES 32-11	8 + 8
ES 32-111	12 + 12
ES 32-20	16 + 0
ES 32-120	20 + 4
ES 32-21	16 + 8
ES 32-121	20 + 12
ES 32-22	16 + 16
ES 32-30	24 + 0
ES 32-130	28 + 4
ES 32-31	24 + 8
ES 32-40	32 + 0
Inputs (isolated)	24 V DC, 8 mA Optocoupler
Outputs (isolated)	Relays 220 V, 5 A 5 change-over and 3 make contacts per card (= 8 outputs) 2 change-over and 2 make contacts per card (= 4 outputs)
Step time	1 to 59 s resp. min
Total time	1 min to 99 hours 59 min
Time base	Quartz

User program memory	C-MOS-RAM 4 k x 8
Battery	Lithium, capacity 5 years for RAM
Program generation	plug-in hand-held programming unit HPG 32
Number of fixed programs	max. 16 programs can be called via key
Program steps	dependent on number of programs and channels
Program indication	LED display for all program channels. The program selected via key is indicated by a correlated LED
Program step indication	3-digit with 7-segment display
Step time respectively total time indication	4-digit via 7-segment display
Start key	start of the selected program
Reset key	stop resp. reset of a selected program

External inputs	program number start; stop/reset step; key interlocking
External program memory	Plug-in storage cassette SPK 32 with CMOS-RAM 4 k x 8 and lithium battery, capacity 5 years, Dimensions (W x H x D) 120 x 65 x 30 mm
Supply voltage	24 V AC ± 15 %
Power consumption	35 VA
Circuit design	microprocessor-controlled
Connections	connectors according to VDE 0110, insulation class C
Operating temperature	0 °C to + 55 °C
Storage temperature	− 10 °C to + 60 °C
Mounting position	any
Mounting method	Front mounting 144 x 144 mm Mounting depth 210 mm
Front panel	Foil front panel with integrated keys
Protection class	according to DIN 40050 for the front IP 50 for the rear IP 30

Prog. no correlation

HPG32	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ES32	1	2	3	4	1A	2A	3A	4A	1B	2B	3B	4B	1AB	2AB	3AB	4AB

Step no.	Step time min	sec	Output 1	2	3	4	5	6	7	8	Input / Output 9	10	11	12	13	14	15	16	Input / Output 17	18	19	20	21	22	23	24	Input / Output 25	26	27	28	29	30	31	32
1																																		
2																																		
3																																		
4																																		
5																																		
6																																		
7																																		
8																																		
9																																		
0			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1																																		
2																																		
3																																		
4																																		
5																																		
6																																		
7																																		
8																																		
9																																		
0			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1																																		
2																																		
3																																		
4																																		
5																																		
6																																		
7																																		
8																																		
9																																		
0			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1																																		
2																																		
3																																		
4																																		
5																																		
6																																		
7																																		
8																																		
9																																		
0			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1																																		
2																																		
3																																		
4																																		
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7																																		
8																																		
9																																		
0			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
			Connector 2								Connector 3								Connector 4								Connector 5							

Type		Date	Name	Program application
	Drawn			
	Approved			
	HEYNAU RAMSTETTER			Program designation
Ind. / Revisions / Date / Name	ES32-PVL3			Program no. HPG32 / ES32

13. A P P E N D I X

13.1 ES 32 Printer Connection

13.1.1 Program Printing

13.2 Bar-Code-Reader (Connection and Operation)

13.3 Storage Cassette SPK 32

13.4 Computer Interface IF 32

13.1 ES 32 Printer Connection (with CENTRONICS INTERFACE)

When the ES 32 is connected to a printer with a Centronics interface (eg. Epson FX80) the program stored in the ES 32 can be printed. After loading the program from a HPG 32 or SPK 32 into the ES 32 the program can then be printed.

A prerequisite for a program printout is the special connection cable that connects the ES 32 and the printer. The ES 32 must be fitted with the software version DRXXXXX (see nameplate). In operation this version of the ES 32 differs from the standard version as follows:

Before printing the ES 32 must have the print mode selected. This is achieved by switching on the supply voltage whilst pressing the start key. The letter P will now appear in the extreme left indicator (STEP-NO). The connection cable is used to connect the printer READY light will come on.

Now before a print-out of a program is possible the program number must be selected and the START key pressed. During the transfer to the printer the Program-No LED remains on. As soon as the LED goes off the program has been transferred and connection to the printer can be cancelled. (The print-out will in time stop, however the time this takes depends on the size of the printer memory buffer).

Should the connection be cancelled (or lost) before the Program-No LED goes out or in the case of the printer not being ready, a hang-up will occur. The ES 32 is waiting for a signal from the printer however it does not come. In this case a reset of the ES 32 (and if necessary the printer) is required. This is achieved by a switching off and on of the supply voltage.

If the false Program-No is selected it can be cancelled with RESET. If no Program-No is selected, by pressing RESET you can exit the print-mode. The P indicator goes off and the ES 32 then operates in the normal-mode.

An acceptable printer must display the following characteristics:

* Input: Parallel (CENTRONICS)

* Number of characters per line: 137,
  selected through DIP-switches.

Programm-No. 01

Step-No.	Time	Channel 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
021	01 sec	X	. . . .	. . . .	. . . .
022	01 sec	 X	. X	. . . .	. . . .
023	INPUT	. . . .	. . . . . . X .	. . X	. . . .
024	INPUT	. . . .	. . . .	 X	. . . .
025	10 sec	. . . .	. . . .	. . . .	. . . .

Step-No.	Time	Channel 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
026	01 sec	. . . . X . . .	. . . .	. . . .	. . . .
027	INPUT	 X	. . . . . X . .	. . . .	. . . .
[illegible]	INPUT	. . . .	 X	. . . . . X . .	. . . .
[illegible]	INPUT	. . . .	. . . .	. . . . . . X .	. . . .
010	01 sec	. . . .	. . . .	. . . .	. . . .

Step-No.	Time	Channel 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
011	10 sec	. . . .	X	X	. . . .
012	INPUT	. . . .	. . . .	. X	. . . .
013	01 sec	. . . .	 X	. . . .	. . . .
014	01 sec	. . . .	. . . .	. . X	. . . .
015	INPUT	X	. . . .	X	. . . .

Step-No.	Time	Channel 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
016	20 sec	. . . .	X X	. . . .	. . . .
017	01 min	X X X X X X X X	. . . .	. . . .	. . . .
[illegible]	INPUT	. . . .	 X	. X	. . . .
[illegible]	10 sec	. . . .	. . . . . . X .	. . X	. . . .
[illegible]	10 sec	. . . .	. . . . . X . .	. . . . . . X .	. . . .

Step-No.	Time	Channel 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
021	RST				

Step-No.	Time	Channel 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
821	10 sec	X	X	X	X	X	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
822	01 min	.	.	.	.	.	.	.	.	X	X	X	X	X	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
823	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
824	10 sec	X	X	X	X	X	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
825	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Step-No.	Time	Channel 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
826	01 min	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.
827	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
828	10 sec	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
829	INPUT	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
830	15 sec	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Step-No.	Time	Channel 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
831	09 min	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
832	08 sec	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
833	05 sec	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
834	10 sec	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
835	60 min	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Step-No.	Time	Channel 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
836	06 sec	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
837	06 sec	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
838	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
839	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.
840	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.

Step-No.	Time	Channel 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
841	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.
842	60 min	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.
843	10 min	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.
844	01 min	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
845	RST																																

Programm-No. 03

Step-No. Time

Channel

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
001	05 sec	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
002	INPUT	.	.	.	.	.	X	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
003	INPUT	X	.	.	.	.	.	.	.	.	.	.	.	.	X	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
004	INPUT	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	X	.	X	.	.	.	.	.	.	.
005	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
006	05 sec	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
007	10 sec	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
008	INPUT	.	.	.	.	X	.	.	.	X	X	X	X	X	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
009	INPUT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	X	X	X	.	.	.	.	.	.	.	.
010	END																																

Programm-No. 04

tep-No.	Time	Channel 1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
001	41 secs	X	. . . .	. . . .	. . . .
002	42 mins	. X	. . . .	. . . .	. . . .
003	43 secs	. . X	. . . .	. . . .	. . . .
004	44 mins	. . . X	. . . .	. . . .	. . . .
005	05 secs	. . . . X . . .	. . . .	. . . .	. . . .
		1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
006	06 secs	. . . . . X . .	. . . .	. . . .	. . . .
007	07 secs	. . . . . . X .	. . . .	. . . .	. . . .
	08 secs	 X	. . . .	. . . .	. . . . .
009	09 secs	. . . .	X	. . . .	. . . .
010	10 secs	. . . .	. X	. . . .	. . . .
		1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
011	11 secs	. . . .	. . X	. . . .	. . . .
012	12 secs	. . . .	. . . X	. . . .	. . . .
013	13 secs	. . . .	. . . . X . . .	. . . .	. . . .
014	14 secs	. . . .	. . . . . X . .	. . . .	. . . .
015	15 secs	. . . .	. . . . . . X .	. . . .	. . . .
		1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 18 19 20 21 22 23 24	25 26 27 28 29 30 31 32
016	16 secs	. . . .	 X	. . . .	. . . .
017	END				

Programm-No. 05

Step-No. Time

Channel

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
001	57 secs	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
002	52 mins	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
003	53 mins	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
004	54 secs	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
005	55 secs	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
006	56 mins	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
007	57 secs	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	58 mins	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
008	RESTART																																

13.2 Bar-Code-Reader connection and operation

* The Bar-Code-Reader is used in conjunction with the ES 32. The ES 32 must contain a program version NCxxxxx. The Bar-Code-Reader is connected on the front of the ES 32 via the HPG socket.

* The Bar-Code-Interface includes a green LED and a red button. The LED lights-up as soon as the interface and the ES 32 are connected. The red button is used to reset the Bar-Code-Reader (in case of a malfunction).

* When the reader pencil is moved over a appropriate Bar-Code the ES 32 program will commence. The program number (1 - 16) that commences depends on the number given in the Bar-Code.

* The specifications of the used Bar-Code are:

  + 2 out of 5 interleaved
  + Print with maximum of 5 characters/inch
  + 10 digits
  + The two extreme right digits are used for the program number, the other 8 digits are not used.

    (Eg. xxxxxxxx13 = Program Number 13).

13.3 STORAGE CASSETTE SPK 32

The accessory - SPK 32 Storage Cassette - serves as an external storage for all programs used with the programmers ES 24 and ES 32. In a SPK all 16 programs can be stored. The data will remain preserved for between 5 years.

Through the use of a Program-Group-Number each cassette can be given an identification number.

The Storage Cassette is plugged via an adapter cable into a 25 pole socket on the front of the ES 24/ES 32.

There are two keys available:

* "S" (Store): Storing of the SPK contents ⟶ ES 32/24

* "L" (Load) : Load the SPK with ES 24/32 - storage contents.

Through the slide switch on the left hand side, the function "Load" can be blocked and at the same time the slide switch set on "S". This proceedure is always recommended, to ensure an unintentional overwriting of the SPK storage contents does not occur.

13.4 Computer Interface IF 32

The computer interface IF 32 permits the connection of a personal computer (PC) with the instrument ES 32. When connected with the software which is obtainable for this instrument and which is stored on a diskette, there is the possibility of convenient compilation, alteration and storage of user programs which are offered as an alternative to the manual programming instrument HPG 32.

Program compilation can be carried out via the PC, without a connection to an ES 32. The operation of the computer is made relatively simple because of the easily unterstood user guidance, i. e. special knowledge is not necessary.

The hardware configuration of the programming position consists of the following components:

- IBM PC/AT or compatible
- interface box IF 32
- connecting cable for the PC to the IF 32
- IBM-compatible printer.

In addition, the program diskette is required, which is delivered together with every computer interface.

14. Fault finding guidelines - ES 32

The following advice is provided to enable the user to alleviate problems through a systematic fault finding and correction procedure. Extensive information on the possible problem source is not provided however.

Problem	Possible cause	Suggested remedy
After switching the ES 32 on there is no indication on the front plate.	1. No 24V AC available 2. Defective fuse S1 on SVG-card. 3. Defective fuse S2 on SVG-card.	1. Connect required 24V power. 2. Replace defective fuse S1. 3. Replace defective fuse S2.
Output signal faulty although channel indicator on front plate is on.	Defective relay output card (RAK).	Interchange with corresponding relay card.
Input signal will not operate although corresponding channel indicator is on.	Input card (DEK) is defective Input signal 24V not available.	Interchange with corresponding input card. Connect required 24V power.
Unable to install a new program. After giving the step number the LED "MEMORY<" on the HPG 32 lights up.	Program memory is not correctly configured e.g. through transfer of program after addition of input/ output cards.	New configuration of the HPG 32 program memory is required (see 9.3.6.4, page 37)
After the entering of a new program the beginning of the following program has been lost or altered.	The new program was entered in the mode "Modify" (LED MODIFY was on). Therefore the memory contents will be over-written (i.e. also the beginning of the following program).	1. Re-enter the effected programs. 2. The entering of a program must be effected in the operation mode. "Program establishing" (LED "MODIFY" is not on).
Mode-key does not function.	Operation mode "Program establishing" is selected (LED "MODIFY" is not on)	Select operation-mode "MODIFY".

561-2901

3 - ORANGE
4 - yellow
5 - GREEN
6 - Blue.
7 - PURPLE
8 - GREY
9 - WHITE
0 - BLACK.