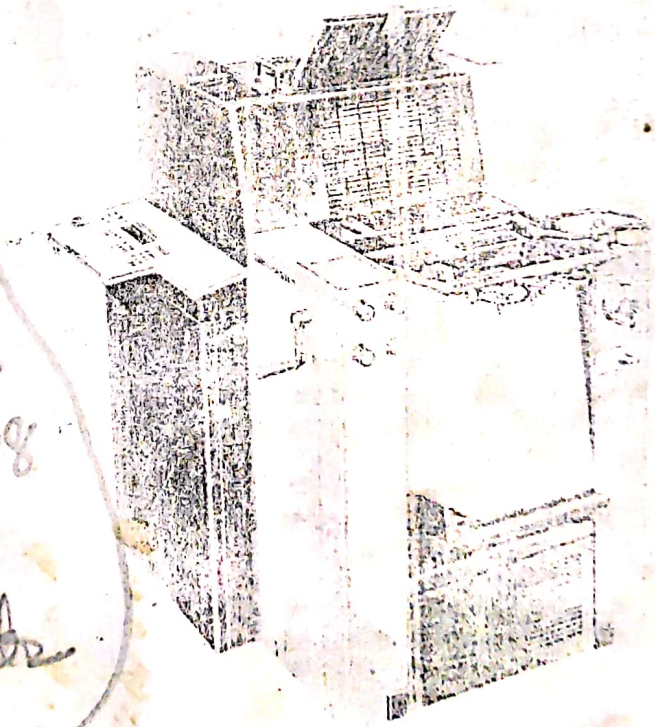
Manual

Quickmaster 46
CP Tronic micro



HDM A1.144 9002/01
1. edition: 2003.01

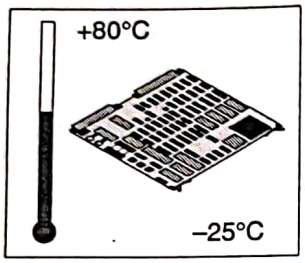
HEIDELBERG

Important safety instructions

- Observe the general and press-specific safety instructions in the operating manual.
- At first start-up or after the exchange of equipment or components check the correct functioning of all safety equipment.
- Control cabinet and machine housing have to be locked while the press is in operation. They may only be opened for repair purposes.
- Make sure that the main power switch is turned off and that there is no voltage applied to the press before you open the control cabinet or the machine housing.
- If it is necessary to repair the press while it is connected to the mains supply, please pay attention to general safety precautions.
- Never exchange components and units while the press is connected to the mains supply.
- Safety equipment must not be modified. Do not remove earth conductors. If it is necessary to disconnect these conductors, please remember to reconnect them after you are finished.
- If extra accessories not corresponding to Heidelberg specifications are installed or mounted, Heidelberg does not accept any liability whatsoever. In each case these accessories must be controlled or locked in a way that no hazards can arise when the press and its devices are operated.

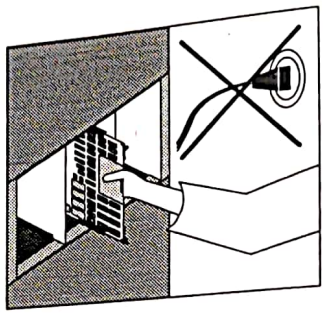
Important: ⚠ ***Observe the handling instructions when replacing subassemblies with electrostatically sensitive components!***

Handling and replacement of electronic subassemblies

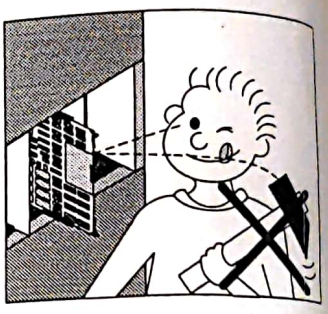


Storage:
NEVER below –25°C
NEVER above +80°C

ALWAYS
put in ESD protective box.

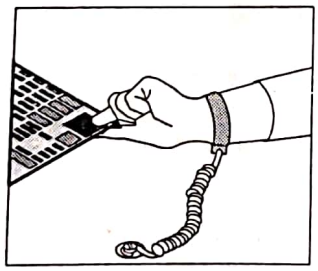


NEVER
replace while connected to mains.

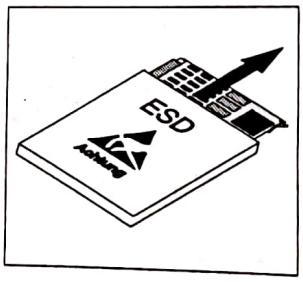


NEVER
insert using force.

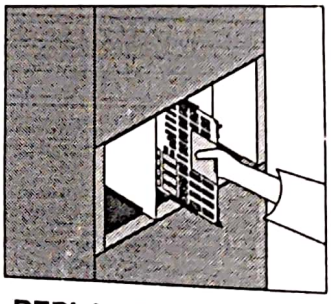
ESD protective measures to be observed when replacing electronic subassemblies



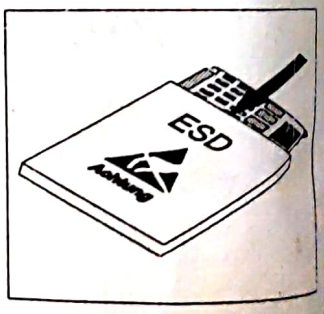
DISCHARING
static charges.



TAKING OUT
of ESD protective box.



REPLACING
electronic subassemblies.

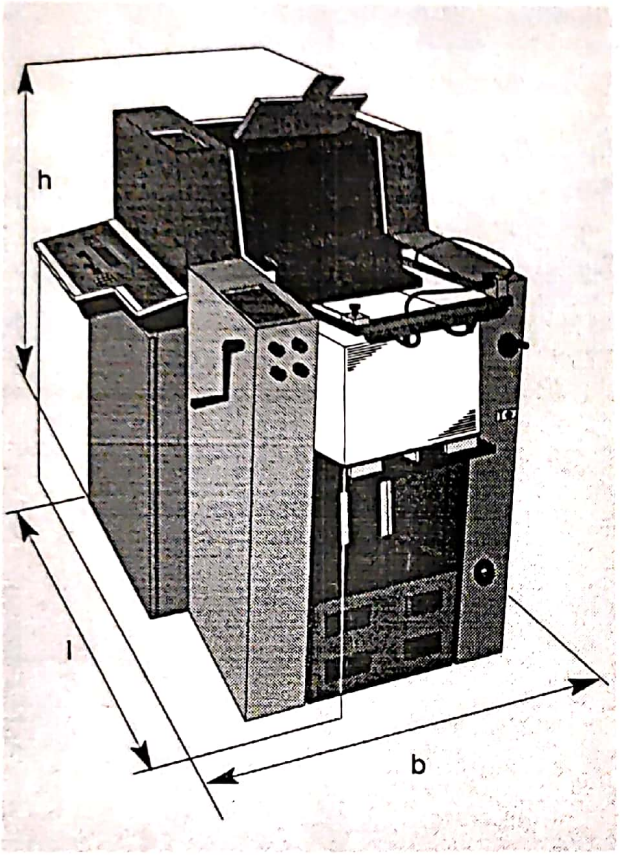


PUTTING
into the ESD protective box.

1. Start-up 1.1 – 1.6

Technical data

Mechanical and electrical data



Dimensions of the printing press

Dimensions:

l = 1.50 m
b = 1.27 m
h = 1.53 m

Weight:

1-colour press: approx. 680 kgs (without pile)

2-colour press: approx. 830 kgs (without pile)

Connecting cable:

Length of power cable = approx. 4 m

Electrical data:

- Power supply: 230V AC
- Matching transformer: 115V AC, 200V AC, 220V AC, 240V AC
- Power frequency: 50/60 Hz
- Building-side back-up fuse:

1-colour press:	115V:	20AT
	200 ... 240V:	16AT
2-colour press:	115V:	32AT
	200V:	25AT
	220 ... 240V:	16AT

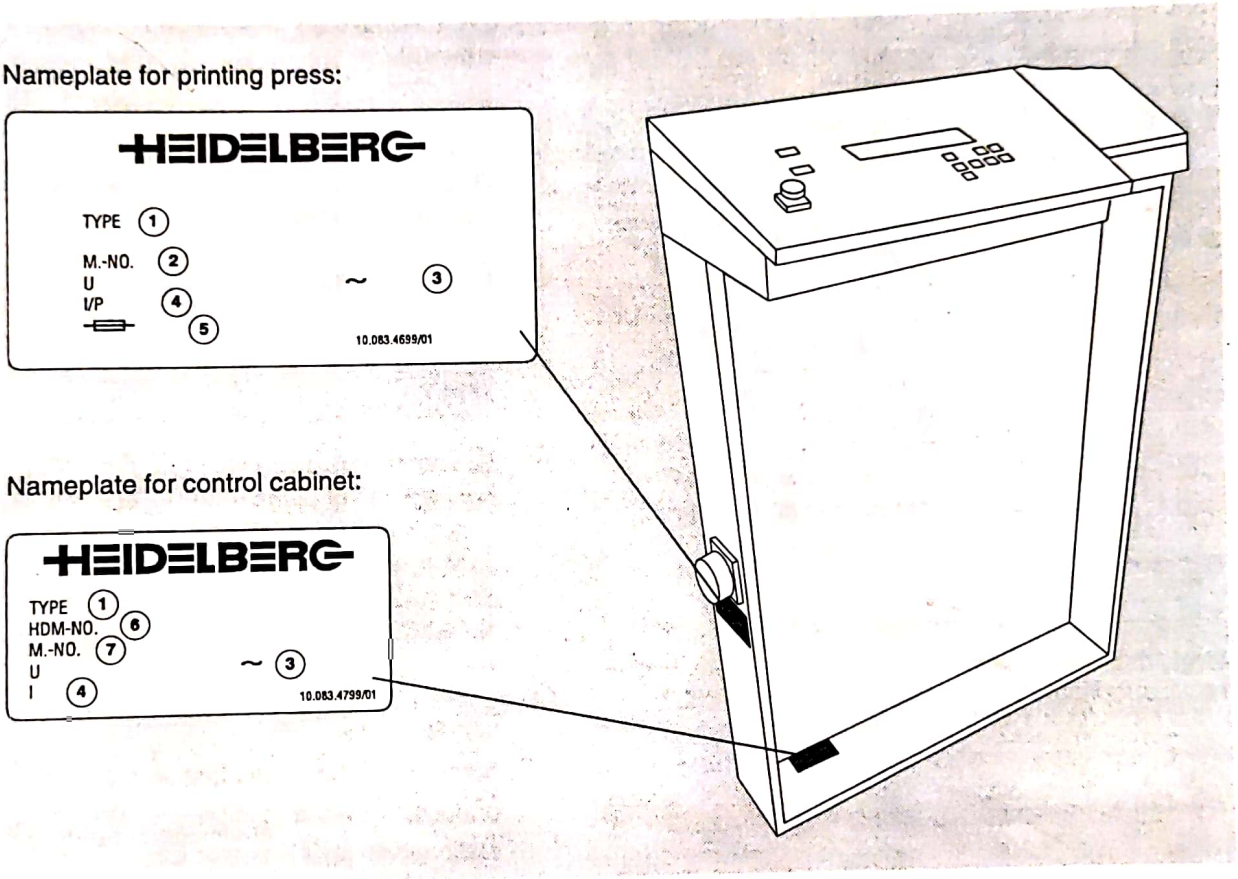
- Power required:

1-colour press:	2.5 kW
2-colour press:	3.0 kW

Nameplates

The nameplate for the printing press is attached on the outside of the control cabinet, below the main switch.

The nameplate for the control cabinet is attached inside the control cabinet, at the bottom.

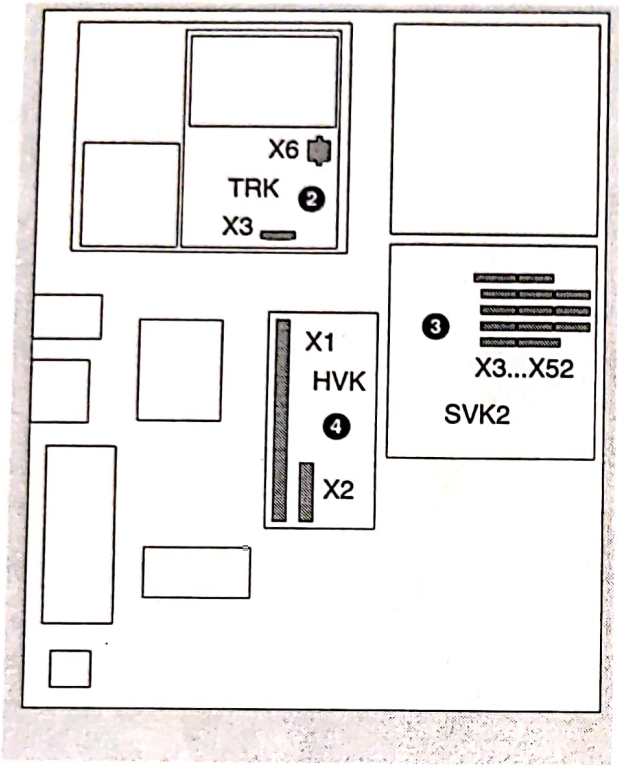


Nameplates

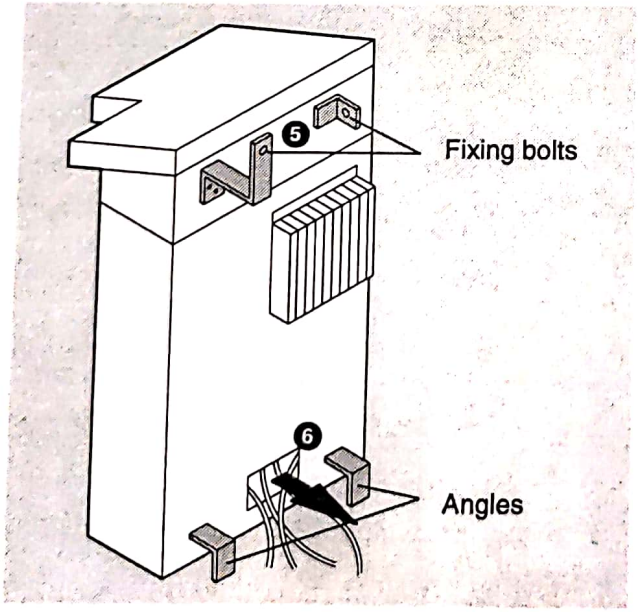
① Press model
② Serial number of the press
③ Mains voltage, type of voltage, frequency
④ Nominal current/nominal power
⑤ Recommended building-side back-up fuse
⑥ HDM-number of control cabinet
⑦ Serial number of control cabinet

Installation instructions

Removal and installation of the control cabinet



Inside of control cabinet



Reverse side of control cabinet

If you have to go through narrow passageways (min. 85cm), the control cabinet can be separated from the printing press for the transport. (Min. 82cm if you also remove the side frame and the side frame guard).

❶ Open the door of the control cabinet. Disconnect the PE conductor from the cabinet door and remove the door.

❷ Loosen the plug connector for the main drive motor M1 :
TRK-X3,
TRK-X6.

❸ Loosen the plug connector on the SVK2 (for connections of plugs refer to page 4.8):
SVK-X3, SVK-X31, SVK-X32, SVK-X33, SVK-X34, SVK-X4, SVK-X41, SVK-X42, SVK-X43, SVK-X44, SVK-X5, SVK-X51, SVK-X52.

❹ Loosen the connections on terminal strip HVK-X1/X2 :
- pump for suction and blast air M2,
- pneumatic system compressor M3,
- static electricity eliminator E2,
- powder spray device E3,
- tape inserter E4.

❺ When loosening the upper fixing bolts, hold the control cabinet tight so that it cannot fall over! Lift out the control cabinet (fixing angles at the bottom).

❻ Lead the connecting cables out of the control cabinet.

❼ Install in reverse sequence.

Note:
Make sure to reconnect the PE conductor to the cabinet door at the end of the installation!

Checks

Before power-up

❶ Smooth running

Check the printing press for smooth running by means of the crank handle. The opening for insertion of the crank handle is located under the guard of the printing unit O.S., above the operating panel.

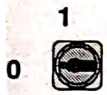
❷ Mains voltage

The building-side power supply is switched off and cannot be switched on accidentally.

Caution:

Even if the main switch is in the "off" position, there are parts in the control cabinet which are in any case still live!

❸ Main switch



The main switch is switched off and cannot be switched on accidentally.

❹ PE-connections

The connections must be tight!
Spring washer and serrated lockwasher must be fitted at the PE-connection of the control cabinet and control cabinet door!

❺ Plug connections

Check for correct plug-in location and tight fit.

❻ Screwed connections, connecting points

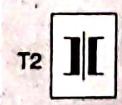
Check all connections and retighten the screws, if necessary.

❼ Building-side back-up fuse

Check the back-up fuses:

1-colour press:	115V:	20AT
	200 ... 240V:	16AT
2-colour press:	115V:	32AT
	200V:	25AT
	220 ... 240V:	16AT

❽ Matching transformer



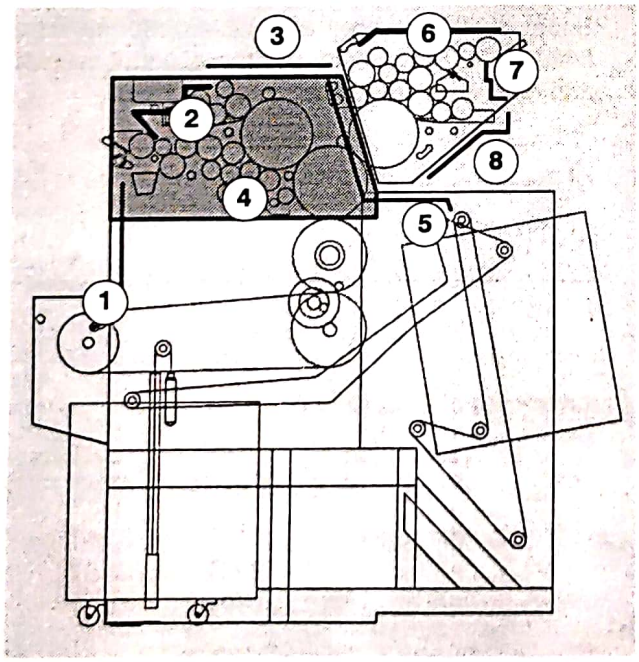
For voltage ranges ≠ 230V AC check the connections at the matching transformer (see page 4.46).

After power-up

Put the press into operation and actuate the equipment mentioned below consecutively and one at a time.

❶	Actuate the "Emergency stop" button	S7
❷	Open the guard of the inking unit	S4
❸	Open the guard of the dampening system	S3
❹	Open the guard of the plate cylinder	S3
❺	Open the printing unit guard O.S.	S6
❻	Open the guard of the blanket cylinder (1-colour press only)	S1
	or	
	the guard of PU2 (2-colour press only)	S1
❼	Open the guard of the inking unit PU2 (2-colour press only)	S5
❽	Open the guard of the dampening system PU2 (2-colour press only)	S2

Each time the printing press stops as quickly as possible. The information display "General malfunction" is flashing.



Guards on press which can be opened

① Guard of inking unit, S4

② Guard of dampening system, S3

③ Guard of plate cylinder, S3

④ Printing unit guard O.S., S6

⑤ Guard of blanket cylinder, S1 (1-colour press only)

⑥ Guard of inking unit PU2, S5 (2-colour press only)

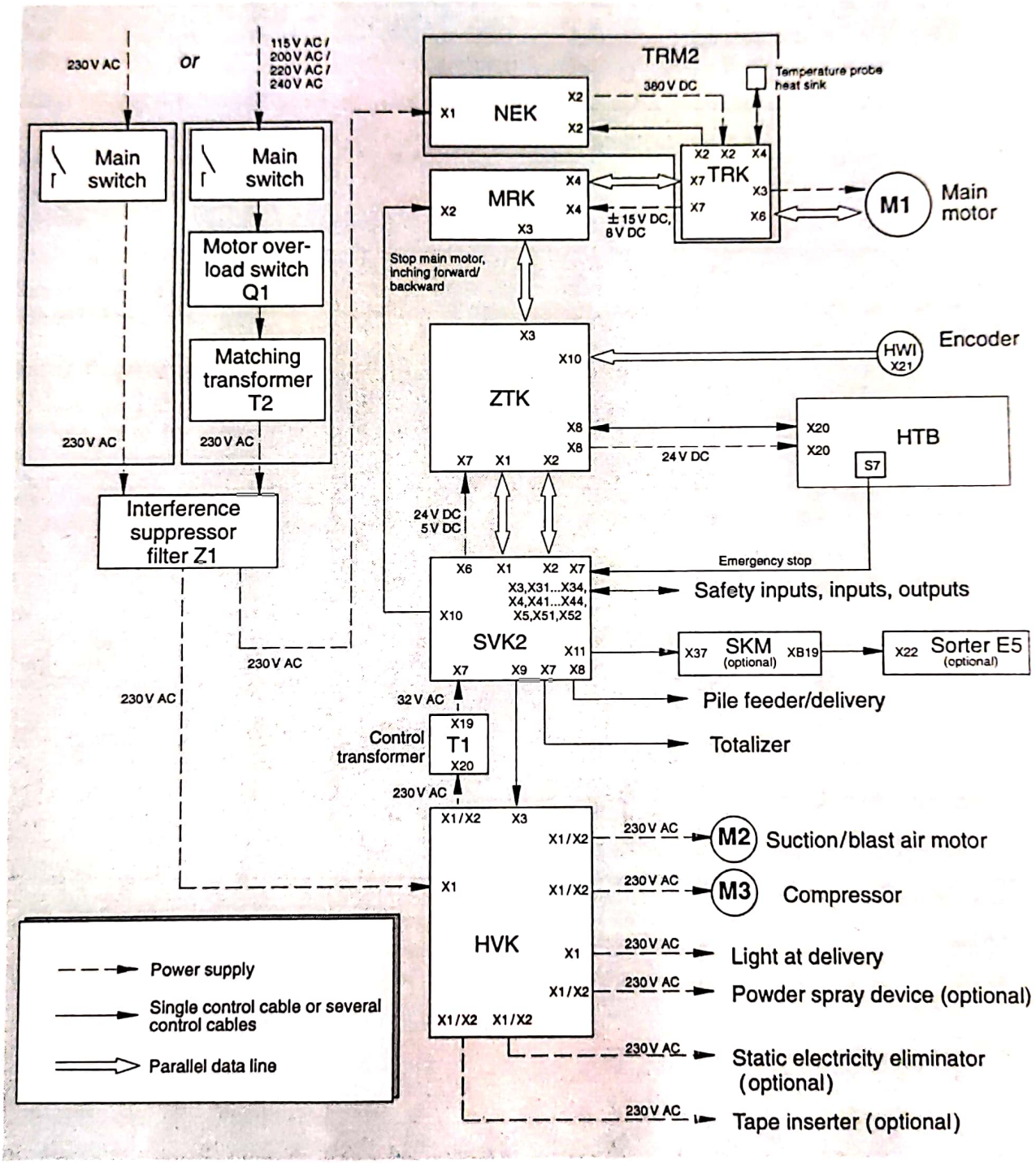
⑦ Guard of dampening system PU2, S2 (2-colour press only)

⑧ Guard PU2, S1 (2-colour press only)

2. Control concept 2.1 – 2.6

Control system of Quickmaster

Block diagram



Block diagram: Quickmaster

Explanations on the block diagram

Power supply

The NEK and HVK require a power supply of 230V AC. The voltage is filtered by the interference suppressor filter Z1. This filter is a low-pass filter, i.e. the high parasitic frequencies are filtered out. If the local supply voltage is not 230V AC, a matching transformer T2 is required in addition. The transformer is protected by the motor overload switch Q1 which is designed for the input voltages of 100V AC, 115V AC, 125V AC, 200V AC, 220V AC and 240V AC.

The control transformer T1 reduces the input voltage of 230V AC to 32V AC; from this voltage, 24V DC (e.g. for inputs and outputs) and 5V DC (for the electronics) are generated on the SVK2 . The main control console is supplied with 24V DC via the ZTK.

On the NEK, 230V AC are rectified and from this voltage, 380V DC intermediate circuit voltage are generated for the TRK. From this intermediate circuit voltage, the chopper-type power supply unit on the TRK then generates 18V DC, ± 15V DC and 8V DC.

Main drive

The ZTK receives the commands the operator enters on the control panel. From the data received, the board determines the setpoint values for the speed and direction of rotation of the main motor. The data is transmitted to the MRK via a parallel data line. On the basis of the Hall signals of the main motor the MRK calculates the control signals for the 6 power transistors. The TRK comprises the power part of the brushless main drive.

TRM2 Transistor control module 2

The NEK and TRK are components of the transistor control module 2 TRM2. They are fixed on the support plate of the TRM2.

Inputs and outputs

All inputs and outputs of the printing press are connected to the SVK2. They are controlled with 24V DC.
The SVK2 and ZTK evaluate the safety inputs independently of each other. On the SVK2 this is effected by means of a hard-wired logic and on the ZTK by the CPU. Both boards can stop the main motor via the MRK and TRK.
The signals of all other inputs are transmitted directly to the ZTK via the SVK2 and evaluated there.

Sorter

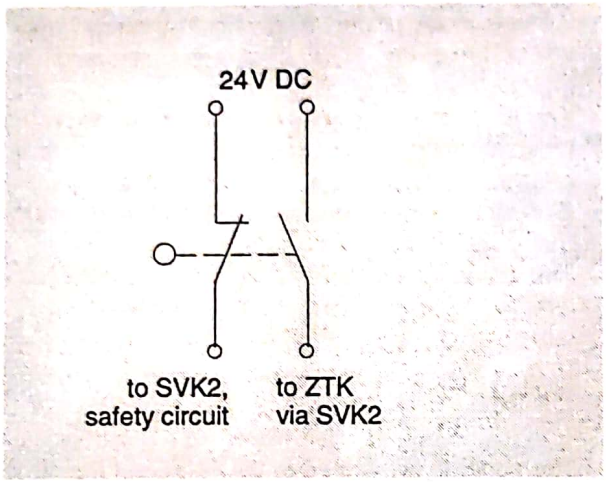
The sorter is connected to the SVK2 via the sorter connection module SKM. The SVK2 merely serves as a connecting port and transmits the signals directly to and from the ZTK.

Equipment with 230V AC

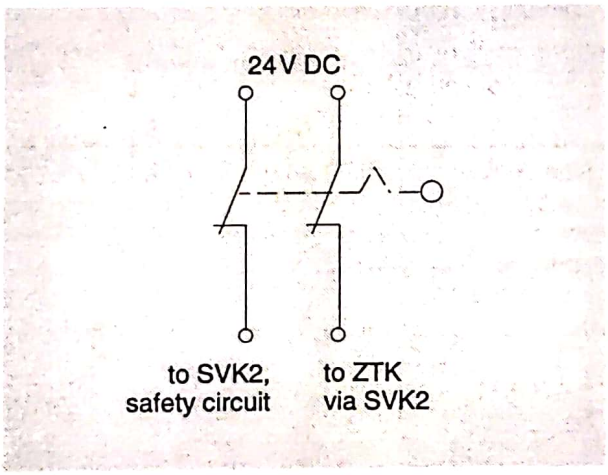
All equipment requiring 230V AC is connected to the HVK and fused. The HVK is equipped with the relays required to switch the pump for suction and blast air, the pneumatic system compressor and powder spray device on and off.

Safety concept

Safety inputs



Guards



Emergency stop S7

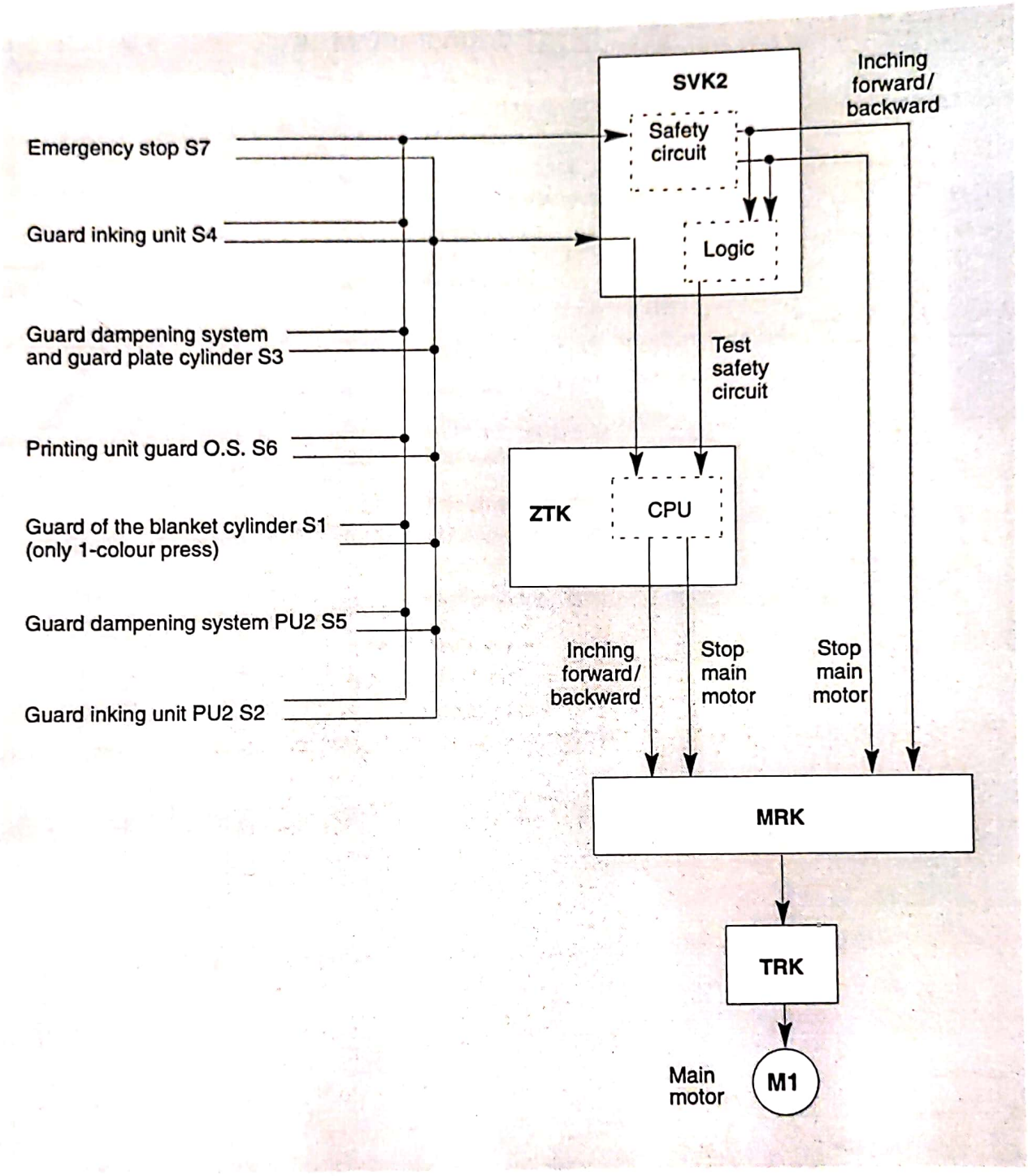
The safety inputs of the printing press are redundant. The switches of the guards have an NC and an NO contact, the "Emergency stop" button has two NC contacts.

One contact is connected to the safety circuit of the SVK2 and the other one to the ZTK via the SVK2. This guarantees that the safety inputs are evaluated independently of each other. On the SVK2 this is effected by means of a hard-wired logic in the safety circuit and on the ZTK by the CPU.

Depending on the result of the evaluation, the following signals are transmitted to the MRK:

- "Inching forward/backward possible" (1 guard open, exception: guard of dampening system and guard of plate cylinder count as one guard)
- "Stop main motor" (2 guards open, exception: guard of dampening system and guard of plate cylinder count as one guard, or emergency stop).

The CPU on the ZTK checks whether both safety circuits have responded. For this purpose, a logic on the SVK2 evaluates the signals "Inching forward / backward" and "Stop main motor". As the result of this evaluation, the signal "Test safety circuit" is transmitted to the ZTK. The signal is "1" if at least 1 guard is open and "0" if all guards are closed. With the help of special function 15, input number 97, the signal state can be displayed (see page 3.15)



Block diagram: safety inputs

3. Malfunctions 3.1 – 3.26

Information displays

Pictograms

Pictograms	Designation	Cause
	Service	– Faults at the main drive – Pile too high (switch "Pile too high at feeder" S17 actuated) – Pile too low (switch "Pile too low at delivery" S18 actuated)
	General malfunction	– Guard open (S1...S7 actuated) – Compressor pressure remains below 6.5 bars (pressure switch "Pneumatic system" S24 actuated) – Emergency stop actuated at control panel – Pile at feeder too high (switch "Pile too high at feeder" S17 actuated) – Pile too low (switch "Pile too low at delivery" S18 actuated)
	Plate change	– Plate removal/insertion stopped prematurely (e.g. by emergency stop)
	Peripherals	– Fault at a peripheral (e.g. sorter)
	Delivery pile	– Pile too low (switch "Pile too low at delivery" S18 actuated) – Pile full (encoder "Pile height control at delivery" B1 set to "1" for more than 50 press rotations ("Paper in front of sensor"))
	Paper jam at delivery	– Overshooting sheet ("Overshooting sheet control" S17 actuated)

Pictograms	Designation	Cause
	Paper jam at feeder	– Press at standstill and sheet in gripper area (VD) – Early sheet (front edge of sheet between 0° and 319.7° (VD)) Display:  – Late sheet (front edge of sheet between >322.7° and after 1 rotation <320.7° (VD)) Display:  – Short sheet (sheet more than 6mm shorter than reference sheet (VD)) Display:  – Long sheet (sheet more than 6mm longer than reference sheet (VD)) Display: 
	Sheet monitoring	– Double-sheet detected (VD)
	Feeder pile	– Missing sheet (no sheet between 0° and 360° (VD)) – Pile at feeder too low or too high (sensor "Pile lifting at feeder" B2, see page 4.24)

Special functions

The special functions are activated with the button "Special functions (S)" and the numerical code. The display shows the special function which was active last.
Switching on/off is effected with the "+"/"–" buttons and for numerical entries the numeric keypad is used.

The special functions are divided into the following groups:

- Direct-selection functions
  SF 1 ... SF 15

  SF 1 ... SF 4 functions for printers
  SF 12 ... SF 15 functions for service staff
- Preselection functions
  SF 16 ... SF 30

  SF 16 ... SF 22 functions for printers
- Numerical preselection
  SF 31 ... SF 40

  SF 31 ... SF 33 functions for printers
  SF 40 function for service staff
- Display functions
  SF 41 ... SF 55
- Diagnosis functions
  SF 56 ... SF 70
- Software functions
  SF 90 ... SF 99

Display, diagnosis and software functions are only intended for the service staff.

Direct-selection functions

Code	Function	Remark
SF 01	Dampening system on/off	When you leave the special function, the dampening system returns to the initial state.
SF 02	Inking unit on/off	When you leave the special function, the inking unit returns to the initial state.
SF 03	Blanket washup device on/off	When you leave the special function, the blanket washup device returns to the initial state.
SF 04	Powdering on/off	To set the powder width. When you leave the special function, the powder function returns to the initial state.
SF 12	Impression on-off mechanism on / off	The valve "Plate cylinder – blanket cylinder" Y1 and afterwards "Blanket cylinder – impression cylinder" Y2 is actuated (only at standstill).
SF 13	Cam plate clamping on/off	The valve "Opening the rear clamping bar" Y7 is actuated (only at standstill).
SF 14	Extended speed range on/off	"On": speed range of printing press 500 ... 10000 rev/h. „Off": speed range of printing press 3500 ... 10000 rev/h.
SF 15	Direct input/output selection	After entering the interlocking code the outputs can be controlled directly and the inputs can be read (see page 3.12).

Preselection functions

Code	Function	Remark
SF 16	Operator guidance on/off	If the operator guidance is active, all buttons whose actuation is allowed are flashing.
SF 17	Numbering on/off	Switches the numbering device on or off.
SF 18	Perforating on/off	Switches perforating on and off.
SF 19	Sheet-length monitoring on/off	With the double-sheet adjustment function the desired sheet length is determined. "On": During paper run this setpoint value is compared with the measured paper lengths. If there is a difference ≥ ±7mm, the press is stopped. "Off": no monitoring. Switching off sheet-length monitoring can result in inking-up of the impression cylinder and impair the print quality! Apart from this, sheets might enter the inking unit or dampening system.
SF 20	Block printing on/off	"On": When the block size entered under SF 31 has been reached, the press interrupts the printing process (manual tape insertion). "Off": function switched off.
SF 21	Sorter operation on/off	Control of connected sorter.
SF 22	Washing of impression cylinder	If "Washing of impression cylinder" has been selected, the blanket cylinder will be thrown on the impression cylinder and washed in addition during the following washup procedure. The selection is always only valid for the next washup! Afterwards, "Washing of impression cylinder" is inactive again.

Numerical preselection

Code	Function	Remark
SF 31	Block preselection tape inserter	Numerical preselection (10 – 99999) of the block size for the tape inserter or manual tape insertion (no tape inserter connected). See also SF 20.
SF 32	Block preselection numbering	Numerical preselection of the block size for numbering.
SF 33	Preselection drying of blanket	Number of revolutions for blanket drying after washing of blanket. Setting range: 0 ... 30.
SF 40	Entry totalizer for printed sheets	Adapting the software totalizer to the electromechanical totalizer after exchange of the ZTK. Entry of totalizer reading via the numerical keypad; confirmation by pressing the "+" button three times. *Note:* The entry is only possible once!

Display functions

Code	Function	Remark
SF 41	Totalizer for press revolutions	Total number of press revolutions since delivery or since exchange of ZTK.
SF 42	Software version	Software version (upper section of display). Press model (lower section of display). Display after actuation of the "+" button: date of software release, e.g. 09.10.4 for Oct. 9, 94 (upper section of display). Check no. (lower section of display).
SF 43	Sheet length	Setpoint value of sheet length in mm (upper section of display) Actual value of length of last sheet (lower section of display)
SF 44	Sheet travel	Display of sheet fed in: early sheet (Early), late sheet (LAtE), short sheet (SHort), long sheet (LonG), missing sheet (no), double-sheet (doubLe), overshooting sheet (SHoot), good sheet (oc). Also refer to page 3.3.
SF 45	Totalizer for printed sheets	Total number of printed sheets since delivery or since exchange of ZTK.
SF 46	Total number of early and late sheets	Total number of early sheets (upper section of display) Total number of late sheets (lower section of display) Can be set to "0" with the button "Delete".
SF 47	Total number of long and short sheets	Total number of long sheets (upper section of display) Total number of short sheets (lower section of display) Can be set to "0" with the button "Delete".

Diagnosis functions

Code	Function	Remark
SF 56	Status codes	Display of fault codes (see page 3.16).
SF 57	Control console test	Display of button code while button is pressed (exception: the button for special functions "S", by which you exit the menu). Simultaneously, all LEDs and segments of the control console display are controlled consecutively.
SF 58	RAM display	Hex. value (upper section of display) RAM address (lower section of display)
SF 59	Program status	Program code (upper section of display) Status number (lower section of display)
SF 60	Press angle	Display of present press angle. Helps to position the press to "0".
SF 61	Main motor error code	If a fault occurs at the main motor, the error code is displayed as a four-digit hexadecimal figure. 0001 No tacho signal. 0002 Speed setpoint value exceeded by more than 50%. 0004 Incorrect speed behaviour during braking. 0008 Fault message from MRK. 0010 Wrong direction of rotation. If several faults occur simultaneously, the corresponding hexadecimal figures are added (e.g. 0004 + 0008 = 000C).
SF 67	Status of plate on PU1 / PU2	Display shows whether there is a plate in the corresponding printing unit and whether the program has been aborted. State of printing unit 1 (upper section of display). State of printing unit 2 (lower section of display). States: "out" no plate on cylinder, "in" plate on cylinder, "Error" program aborted during plate transport. Plate insertion and ejection are displayed by symbols.
SF 68	Sheet arrival angle	The display shows at which degree the sheet fed in passes the front alignment control (VD).

Code	Function	Remark
SF 69	Adjustment and check of pile height	Evaluation of the pulse signals B2 "Pile lifting at feeder" during "Run" (also see page 3.18): feeder pile in pile-raising zone (Lo), feeder pile too high (high), feeder pile too low (deep), feeder pile OK (Good). At standstill state of sensor B2 ("1" or "0"). Press angle (lower section of display) (see page 4.27).
SF 70	Adjustment of encoder/ triple-speed shaft B6	Edge display (upper section of display) and press angle (lower section of display) (see page 4.32)

Software functions

Code	Function	Remark
SF 90	Actual value press speed	Display of actual press speed in steps of 20 (lower section of display).
SF 91	Program statuses	Stores the last 36 program statuses.
SF 92	Autoplate reset	Autoplate error reset. Affects the printing unit selected by the plate inserter. Caution! The reset becomes effective immediately after activation of special function 92.

Direct input/output selection

After entering an interlocking code and selecting special function 15, the outputs can be controlled directly (with few exceptions) with the +/ – buttons.

The states of the inputs are displayed.

Activate the special functions:

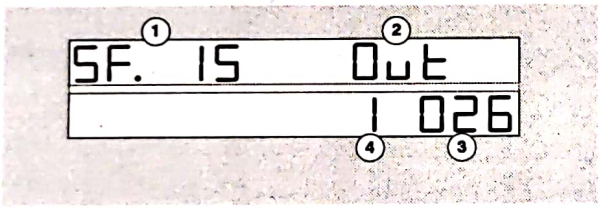
[S]

Enter the interlocking code... .

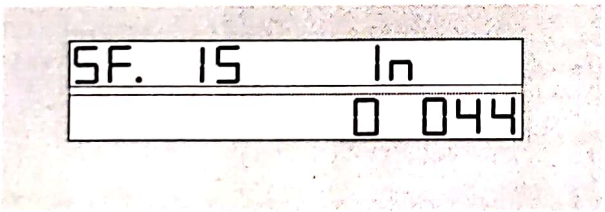
Activate special function 15:

[1] [5]

The individual inputs/outputs can now be selected via the numerical keyboard.



Display of special function 15, output 26



Display of special function 15, input 44

① SF.15 = special function 15 (direct input/output selection)

② Out ≙ output SVK2 / ZTK
In ≙ input SVK2 /ZTK

③ Input/output number (see following pages)

④ State of input/output
I = 24 V DC
0 = 0 V

Input/output number	Input/output	Electrical designation
0–4	IN	–
5	IN	Guard of inking unit PU2 S5
6	IN	–
7	IN	Pile too high at feeder S17
8	IN	Detection of numbering device (connected or not)
9, 10	IN	–
11	IN	Detection of dryer (connected or not)
12	IN	Fault message / dryer
13	IN	Detection of tape inserter (connected or not)
14	IN	Button for tape insertion
15	IN	Pressure switch for pneumatic system S24
16	OUT	Condensate drain valve Y19
17	OUT	–
18	OUT	Transport motor / tape inserter
19	OUT	Tape cutter / tape inserter
20	OUT	–
21	OUT	Powder spray device E3 on/off
22	OUT	Dryer on/off
23	OUT	Pump for suction and blast air M2 on/off
24	OUT	Ink ductor on/off PU1 Y13
25	OUT	Inking form rollers on/off PU1 Y3
26	OUT	Plate cylinder – blanket cylinder PU1 Y1
27	OUT	Blanket cylinder – impression cylinder PU1 Y2
28	OUT	Dampening form roller on/off PU1 Y5
29	OUT [1]	Blanket washup device on/off Y5
30	OUT	–

[1] cannot be controlled

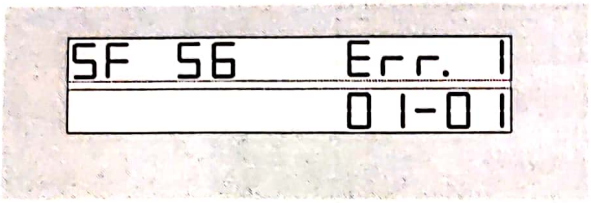
Input/output number	Input/output	Electrical designation
31	OUT	Feeder / enabling of suction air Y16
32	OUT	Delivery / descent release Y17
33	OUT	Throwing the numbering device on/off Y20
34	OUT	Advancing the numbering device on/off Y22
35	OUT	Feeder / lift release Y18
36, 37	OUT	–
38	OUT [1]	Opening the rear clamping bar PU1 Y7
39	OUT	–
40	IN	Emergency stop HTB S7
41	IN	Guard of blanket cylinder or guard of PU2 S1
42	IN	Overshooting sheet control S21
43	IN	Guard of plate cylinder and guard of dampening system S3
44	IN	Guard of inking unit S4
45	IN	Guard of printing unit O.S. S6
46	IN	–
47	IN	Pile height control at delivery B1
48	IN	–
49	IN	Position of Autoplate PU1/PU2 S22
50	IN	PU2 thrown on/off S23
51	IN	–
52	IN	Crank handle at feeder S19
53	IN	Crank handle at delivery S20
54	IN	Sorter master-control
55	IN	Sorter feed-control
56, 57	IN	–

[1] cannot be controlled

Input/output number	Input/output	Electrical designation
58	IN	Pile lifting at feeder B2
59–61	IN	–
62	IN	Front edge of sheet VD (B4)
63	IN	Double-sheet VD (B5)
64	OUT	Ink ductor on/off PU2 Y14
65	OUT	Inking form rollers on/off PU2 Y9
66	OUT	Plate cylinder – blanket cylinder PU2 Y8
67	OUT	–
68	OUT [1]	Opening the front clamping bar PU2 Y11
69	OUT [1]	Opening the rear clamping bar PU2 Y12
70–72	OUT	–
73	OUT	Unlocking the tool barrier PU2 Y24
74–79	OUT	–
90	IN	Pile too low at delivery S18
91	IN	Guard of dampening system PU2 S2
92–96	IN	–
97	IN	Test safety circuit (see page 2.4)
100	OUT	–
101	OUT	Totalizer (totalizer reading +1) P1
103	OUT	Perforating disc on/off
104	OUT	Dampening form roller on /off PU2 Y10
105	OUT	Solenoid valve in powder spray device (powdering cycle)
106	OUT [1]	Opening the front clamping bar PU1 Y6
107–109	OUT	–

[1] cannot be controlled

Status codes



Display of status codes

If you select the special function 56, a numerical code will be displayed which gives closer information on the fault – provided the cause of the fault is known.
Activating the special function 56:

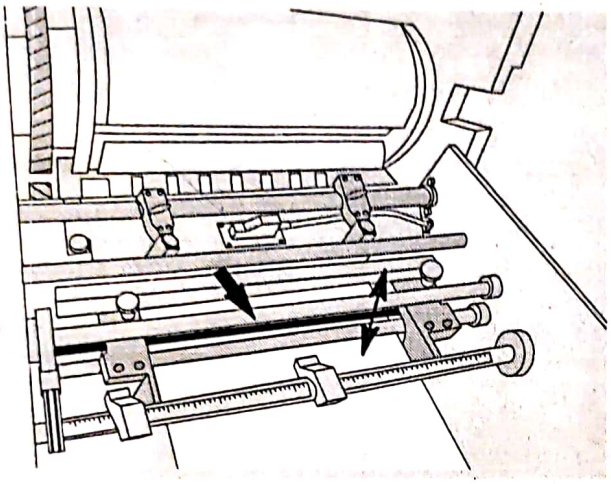
S → 5 6

If several faults have occurred, you can scroll through the status codes by means of the "+" / "–" buttons.

Code	Group	Cause of fault
01–01	Printing unit	Guard of inking unit S4
01–02	Printing unit	Guard of plate cylinder S3 or guard of dampening system S3
01–03	Printing unit 1	Printing unit guard O.S. S1
01–04	Printing unit 1	Encoder of triple-speed shaft B6
01–05	Printing unit 1	Plate insertion or removal interrupted (e.g. emergency stop, guard open). Inch press backward until the button "Plate change" is flashing. Press button "Plate change" and remove plate.
02–01	Printing unit 2	Guard of inking unit PU2 S2
02–02	Printing unit 2	Guard of dampening system PU2 S5
11–01	Feeder	Crank handle / feeder S19
11–02	Feeder	Pile too high at feeder S17
11–04	Feeder	Guard at feeder S1 (only 1-colour presses)
11–05	Feeder	Pressure switch for pneumatic system S24
11–06	Feeder	Double-sheet VD
11–07	Feeder	Press at standstill and sheet in gripper area VD
12–01	Delivery	Crank handle / delivery S20
12–03	Delivery	Pile too low at delivery S18
12–04	Delivery	Overshooting sheet control S21
13–01	Console	Emergency stop S7
15–01	Control cabinet	Fault message of MRK
15–02	Control cabinet	Warning of MRK: temperature of main motor M1 too high

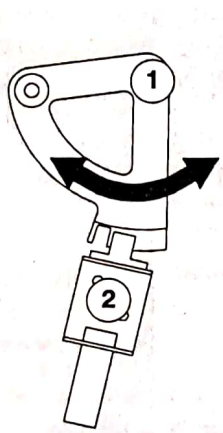
Feeder pile

Pulse signals of sensor B2



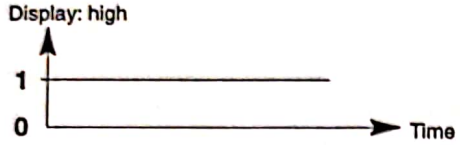
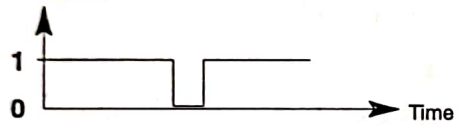
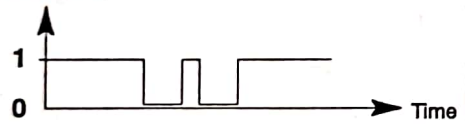
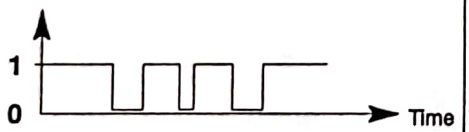
Feeder bar

The pile board is inched up depending on the paper consumption. For this purpose, the bar at the feeder is moved mechanically up and down above the feeder pile. The downward movement is stopped when the bar comes to rest on the top sheet of the pile. The segment disk for the sensor B2 is connected with the bar via a control cam; it moves back and forth and thus the sensor is damped depending on the pile height. The sensor generates the pulse signals required for evaluating the pile height and inching up the paper pile.

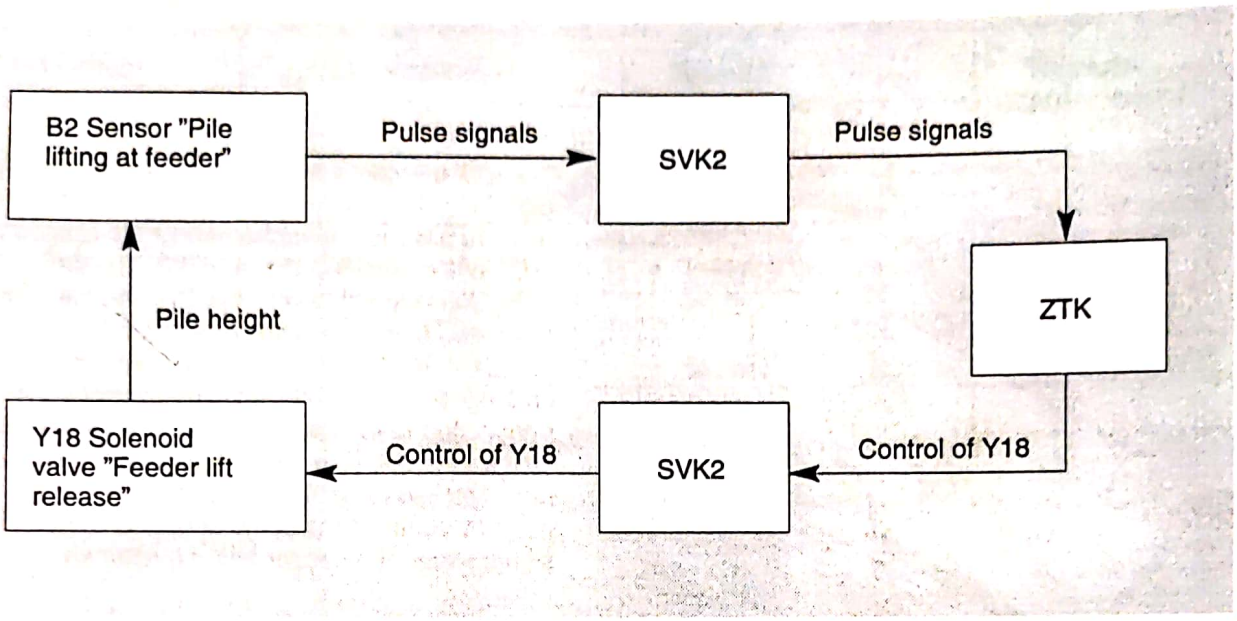


Pile height adjustment at feeder, sensor B2 on O.S.

① Segment disk
② Sensor B2

Pulse signal (1 press revolution)	Position of pile	Reaction
0 pulses Display: high 	Pile too high	– Suction air off – Press stops – Information display "Pile height at feeder" is flashing
1 pulse Display: good 	Pile OK	– No reaction
2 pulses Display: lo 	Pile in pile-raising zone	– Pile is raised (solenoid valve "Feeder lift release" Y18 controlled)
3 pulses Display: deep 	Pile too low	– Suction air off – Information display "Pile height at feeder" is flashing

Closed-loop control circuit



Closed-loop control circuit: pile lifting at feeder

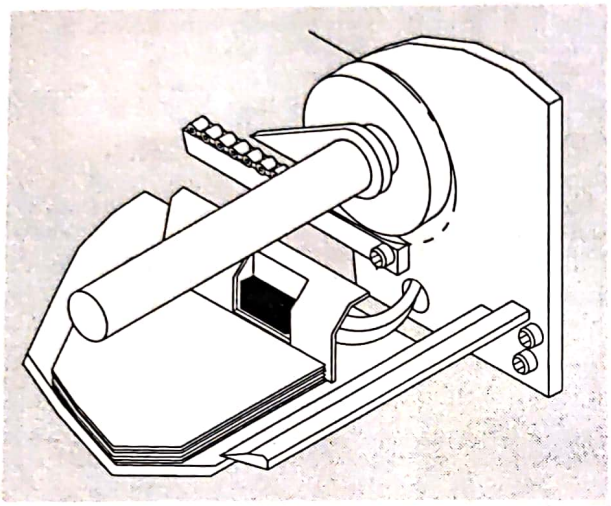
The sensor B2 "Pile lifting at feeder" is connected to the SVK2. Depending on the pile height it generates 0, 1, 2 or 3 pulses per press revolution. These pulses are transmitted to the ZTK via the SVK2. The pulses are evaluated on the ZTK. Depending on the number of pulses received, the solenoid valve Y18 "Feeder lift release" is controlled or not controlled. As long as the solenoid valve is controlled, the feeder pile is inched up 0.8 mm per press revolution.
If the pile is in the pile-raising zone (2 pulses from sensor B2), the solenoid valve remains controlled until the pile has left the pile-raising zone (1 pulse from sensor B1).

Malfunctions

Malfunction	Possible cause	Remedy	Remarks
• No or incorrect inching of pile (pile too high/low)	• Wrong adjustment of sensor B2 "Pile lifting at feeder". • Solenoid valve Y18 "Feeder lift release" defective. • SVK2 defective • ZTK defective • Crank handle inserted	• Readjust sensor B2 "Pile lifting at feeder". • Replace the solenoid valve Y18. • Replace the SVK2. • Replace the ZTK. • Disengage the crank handle.	• See page 4.25

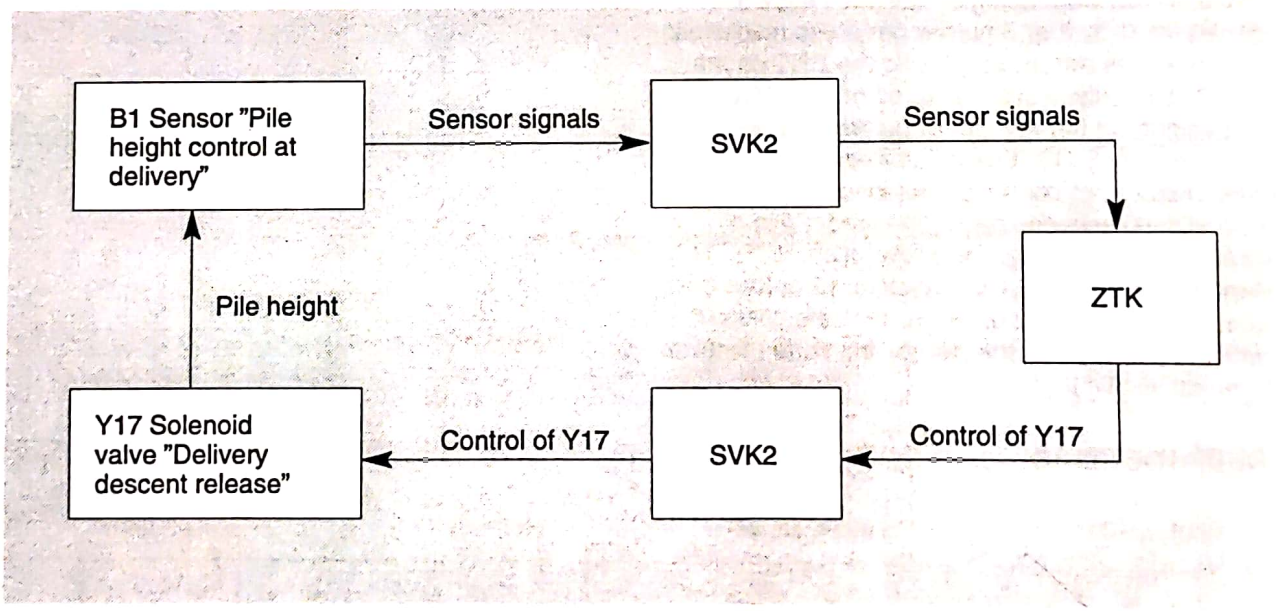
Delivery pile

Closed-loop control circuit



Sensor B1 at delivery pile, O.S.

The delivery pile is inched down depending on the number of sheets in the delivery. At the top of the delivery pile the capacitive sensor B1 is fitted on the O.S.. It is connected to the SVK2. The sensor signals are transmitted to the ZTK via the SVK2 and evaluated there. Depending on the sensor signal, the solenoid valve Y17 "Delivery descent release" is controlled or not controlled. The control signal is transmitted to the solenoid valve via the SVK2. As long as the solenoid valve is controlled, the delivery pile is inched down 0.8 mm per press revolution. It remains controlled until the sensor changes its signal state. The sensor has a hysteresis.



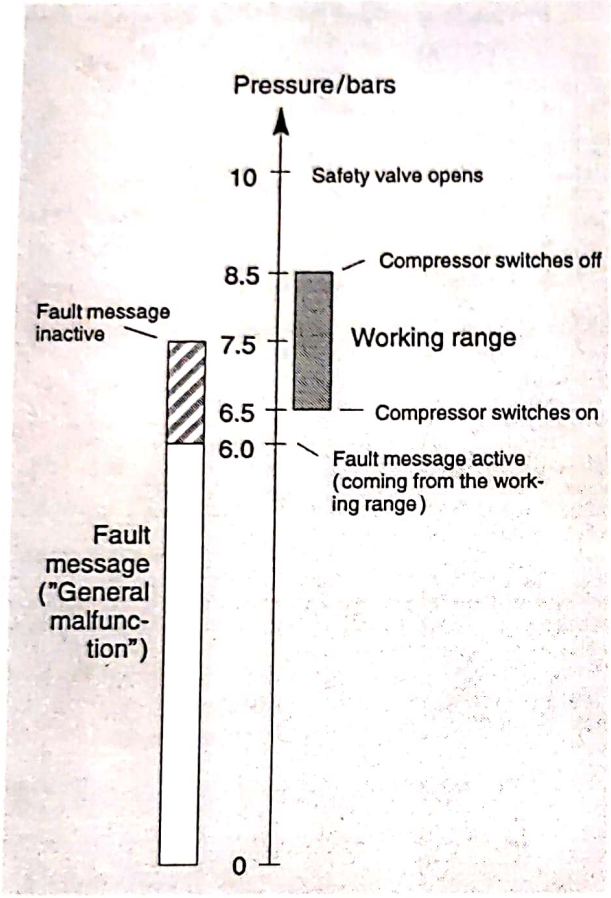
Closed-loop control circuit: pile lowering at delivery

Malfunctions

Malfunction	Possible cause	Remedy	Remarks
• No or incorrect inching of pile (pile too high/low)	• Wrong adjustment of sensor B1 "Pile height control at delivery". • Solenoid valve Y17 "Delivery descent release" defective. • SVK2 defective • ZTK defective • Crank handle inserted	• Readjust sensor B1 "Pile height control at delivery". • Replace the solenoid valve Y17. • Replace the SVK2. • Replace the ZTK. • Disengage the crank handle.	• See page 4.23

Pneumatic system

Method of functioning



Pressures in the pneumatic system

When the printing press is switched on (main switch "on"), the pneumatic system compressor M3 is started up. Its function is to generate compressed air for the pneumatic elements.

The compressed air is stored in the pressure tank. The tank is equipped with the pressure switches "Pneumatic system" S27 and S24, the start-up relief valve Y25, the condensate drain valve Y19 and a safety valve.

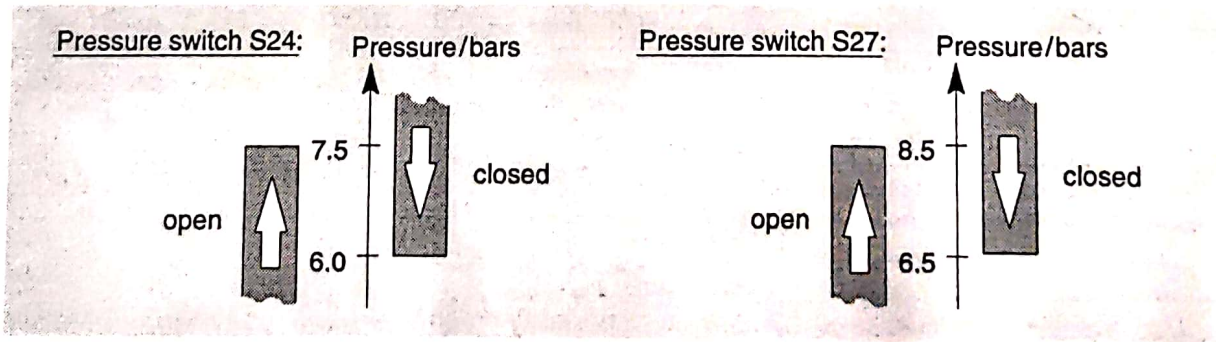
At first, the pressure is built up until 8.5 bars have been reached (switch S27 closes). The compressor switches off. If the pressure in the pressure tank drops to 6.5 bars (switch S27 opens), the compressor switches on again until 8.5 bars have been reached. The pressure switch "Pneumatic system" S27 has a hysteresis.

If the pressure drops below 6.0 bars, the pressure switch "Pneumatic system" S24 signals the CP Tronic control system that the pressure in the pressure tank is too low (switch open). If the pressure rises again, the error message will be cancelled at 7.5 bars (switch closes). The pressure switch "Pneumatic system" S24 has a hysteresis.

The pneumatic system compressor M3 must not start up against pressure. This is prevented by the start-up relief valve Y25. It is always actuated together with the compressor. Without power it is open and the line between the compressor and pressure tank is vented.

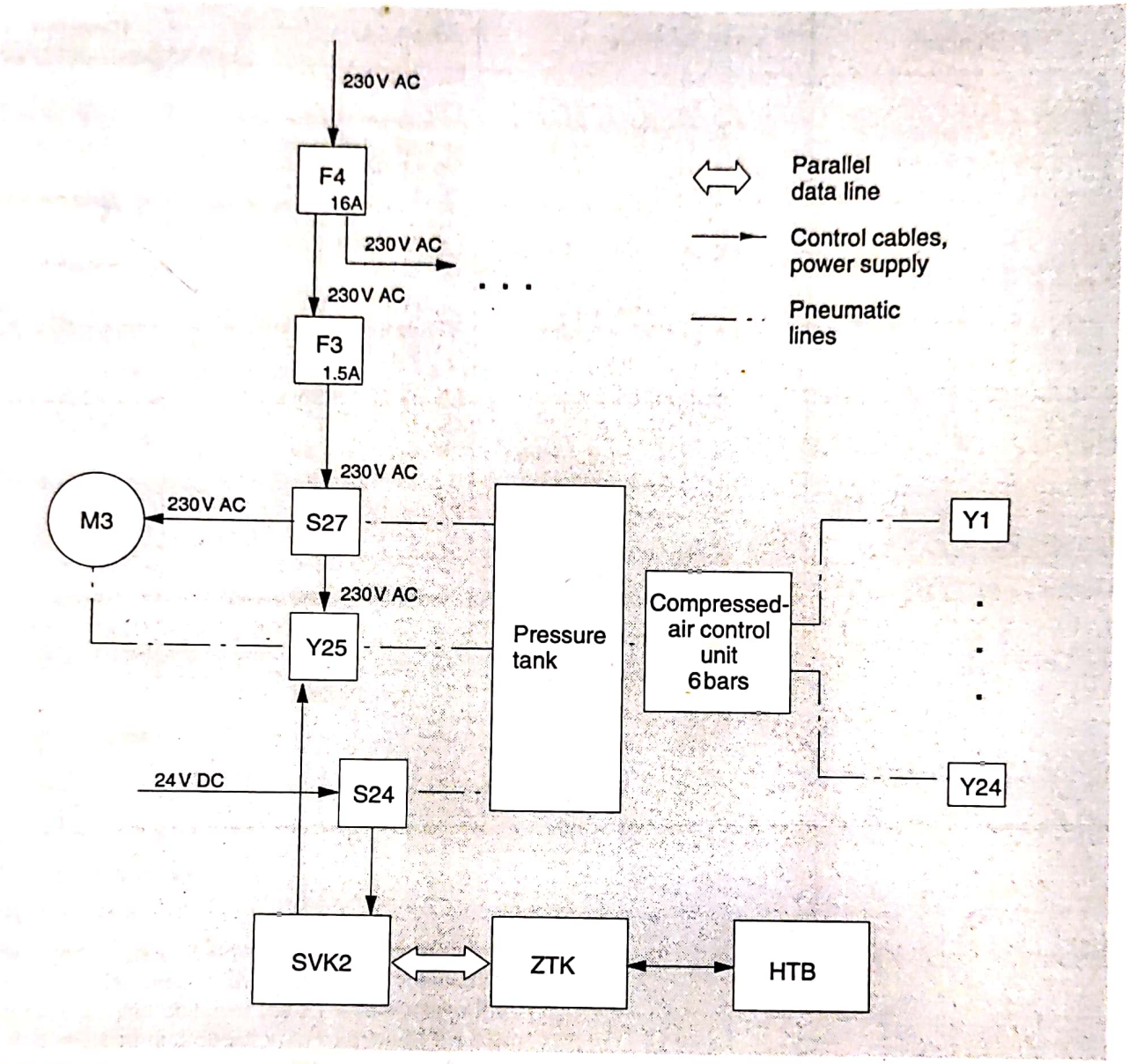
Every 20 minutes the condensate drain valve Y19 is actuated for 2 seconds by the CP Tronic control system.

The safety valve opens at a pressure of 10 bars.



Function of pressure switches S24 and S27

Block diagram



Block diagram: pneumatic system

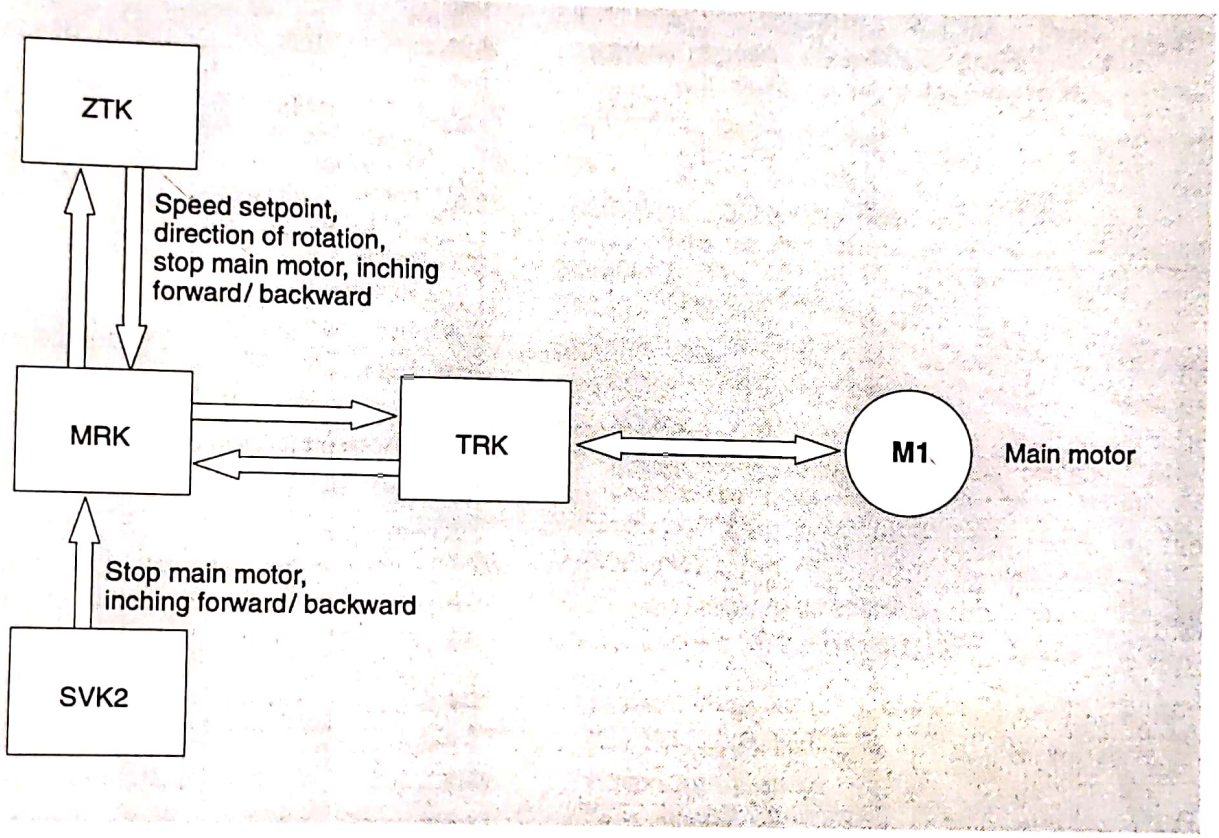
M3	–	Pneumatic system compressor
F4	–	Main fuse
F3	–	Thermal circuit-breaker on the HVK
S27	–	Pressure switch "Pneumatic system"
Y25	–	Start-up relief valve
S24	–	Pressure switch "Pneumatic system"
SVK	–	Control voltage distributor board
ZTK	–	Central control board
HTB	–	Main control console
Y1...Y24	–	Pneumatic valves

Malfunctions

Malfunction	Possible cause	Remedy	Remarks
• The compressor does not start up	• The thermal circuit-breaker F3 on the HVK has tripped.	• Reset the thermal circuit-breaker F3 on the HVK.	• See page 4.2
	• Fuse F4 defective.	• Replace the fuse F4.	• See page 4.2
	• Power cable defective.	• Check the power cable.	
	• Pressure switch "Pneumatic system" S27 defective.	• Replace the pressure switch "Pneumatic system" S27.	
	• Start-up relief valve Y25 defective.	• Replace the start-up relief valve Y25.	
	• The thermal protection in the compressor has tripped.	• Wait until the compressor has cooled down (protection is automatically reset).	
	• ZTK defective.	• Replace the ZTK.	
	• SVK2 defective.	• Replace the SVK2.	
	• HVK defective.	• Replace the HVK.	
	• Compressor defective.	• Replace the compressor.	

Main drive

Block diagram



Block diagram: main drive

The printing press is driven by a brushless d.c. motor. On the basis of the commands entered at the main control console, the ZTK determines the speed setpoint and direction of rotation of the main motor and transmits them to the MRK. On the MRK the control signals for the power transistors, which are part of the TRK, are generated. The MRK monitors the functioning of the motor and shuts it down, if necessary.

Malfunctions

Malfunction	Possible cause	Remedy	Remarks
• The main motor does not start up	• Fuse F1 on NEK defective	• Replace fuse F1.	• See page 4.6
	• Motor temperature too high	• Let the motor cool down. The blocking of the motor is cancelled automatically by the CP Tronic control system.	
	• NEK defective	• Replace the NEK.	
	• TRK defective	• Replace the TRK.	
	• MRK defective	• Replace the MRK.	
	• ZTK defective	• Replace the ZTK.	
	• SVK2 defective	• Replace the SVK2.	
	• Press blocked mechanically		

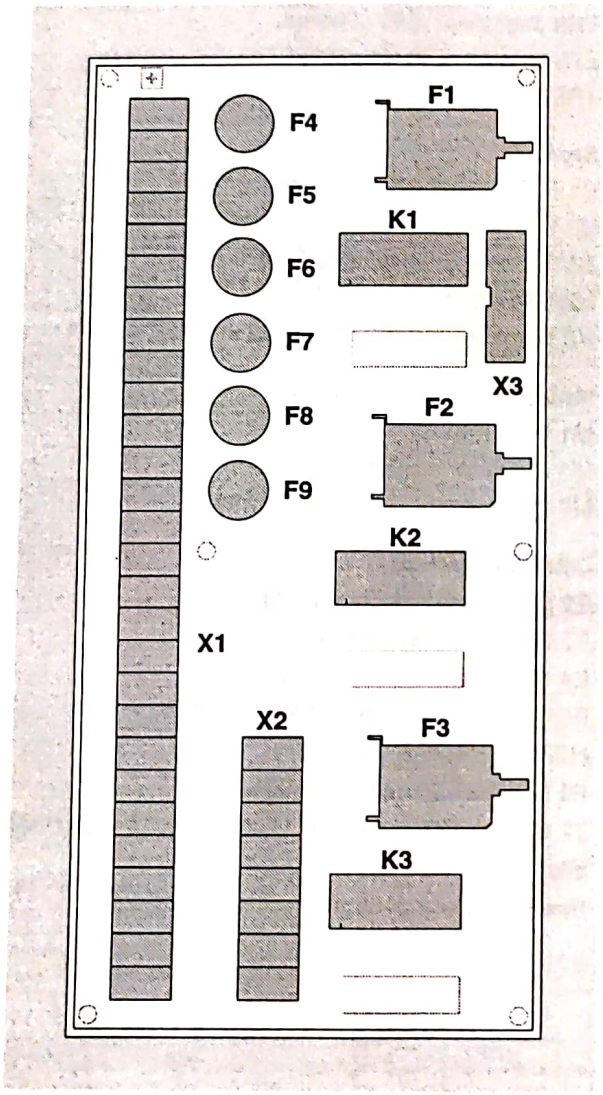
4. Components

4.1 – 4.48

Electronic boards

HVK Main current distributor board

Design



Main current distributor board HVK

Protective devices and fuses:

F1 Thermal circuit-breaker, pump suction and blast air M2;
tripping current: 5A
reset possible after cooling

F2 Thermal circuit-breaker, not used

F3 Thermal circuit-breaker, compressor "Pneumatic system" M3;
tripping current: 1.5A
reset possible after cooling

F4 Fuse 16 AT for:
- pump suction and blast air M2
- compressor "Pneumatic system" M3
- blower M4
- powder spray device E3.

F5 Fuse 6.3 AT for:
- static electricity eliminator E2
- tape inserter E4.

F6 Fuse 1.6 AT for primary side T1.

F7 Fuse 1.6 AT for primary side T1.

F8 Fuse 6.3 AT for:
- static electricity eliminator E2
- tape inserter E4.

F9 Fuse 16 AT for:
- pump suction and blast air M2
- compressor "Pneumatic system" M3
- powder spray device E3.

Relays:

K1 Relay pump suction/blast air M2

K2 Relay compressor "Pneumatic system" M3

K3 Relay powder spray device E3

Terminal strips:

X1 Connections for M2 through M4 and E1 through E4

X2 PE connections

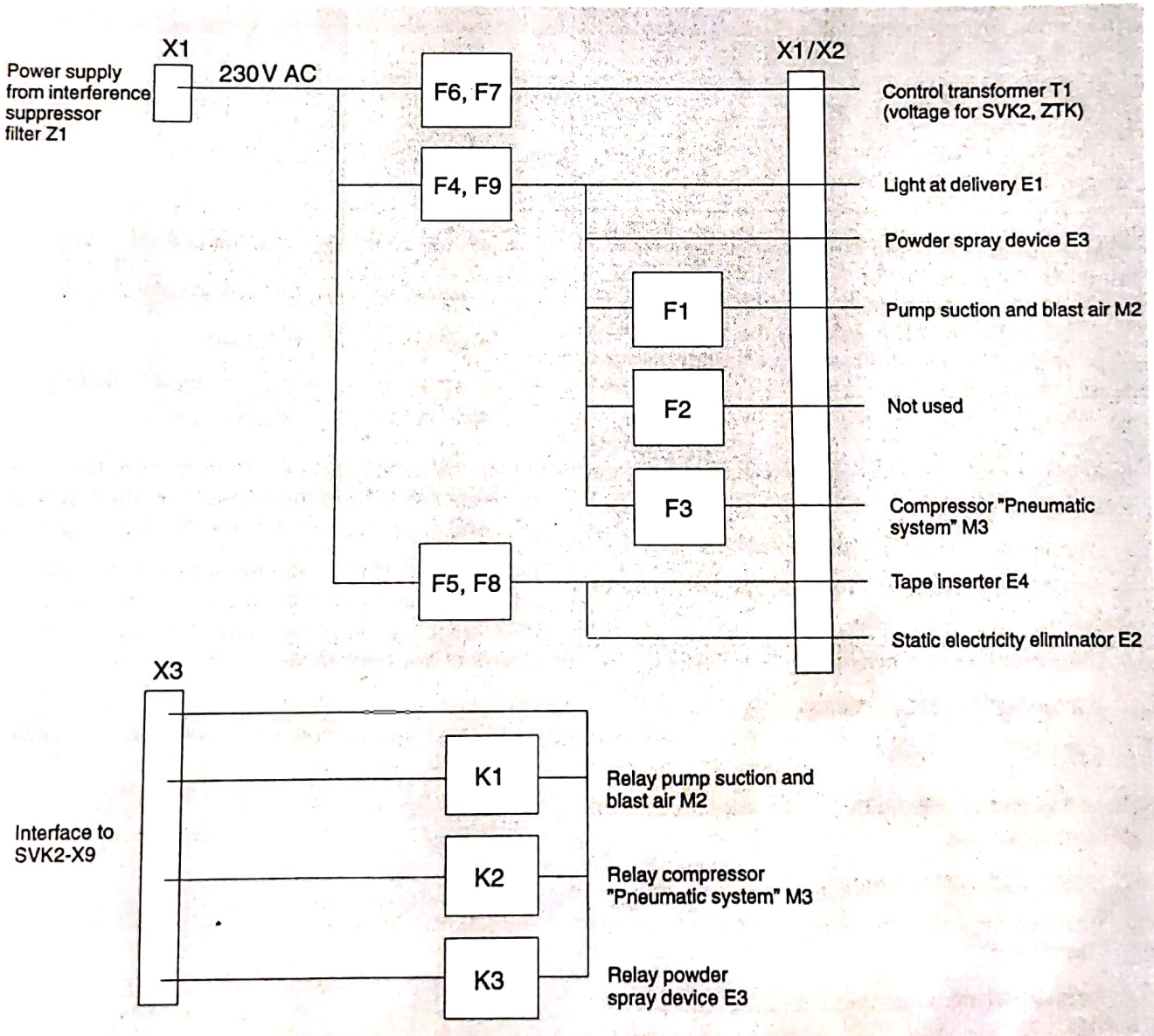
X3 Plug connector of SVK2-X9 for control of HVK-K1 through K3

Task

The main current distributor board HVK receives 230V AC from terminal strip X1. It is equipped with protective devices and fuses for the equipment with 230V AC and the mains transformer T1.

Apart from this, the HVK is equipped with the relays switching the pump for suction and blast air M2, the powder spray device E3 and the compressor "Pneumatic system" M3 on/off. The control signals to switch or disengage the relays come from the SVK2. Switching on and off is timed by the ZTK.

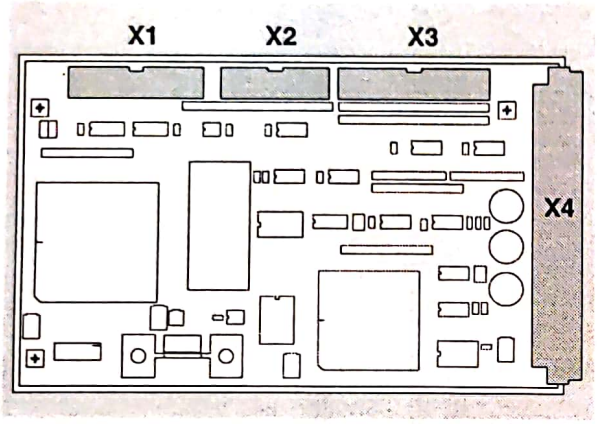
Block diagram



Block diagram: HVK

MRK Motor control board

Design



Motor control board

Plug connectors

X1 Not used
X2 Interface to SVK2-X10
X3 Interface to ZTK-X3
X4 Interface to TRK-X7

Task

The motor control board MRK assures the closed-loop control of the main drive. For this purpose, it receives the speed setpoint and direction of rotation from the ZTK. The MRK receives the supply voltage of ± 15V DC and 8V DC from the transistor control board TRK.

For control and monitoring of the main drive and the transistor control board TRK the MRK evaluates the following signals:

- temperature and codes from M1
- Hall signals from the rotor position encoder of M1
- temperature and codes from the TRK
- intermediate circuit voltage
- actual motor current.

From the control voltage distributor board SVK2 the MRK receives the:

- stop signal for the main motor M1
- enable signal for the operating modes "Inching" and "Run"
- speed setpoint and direction of rotation.

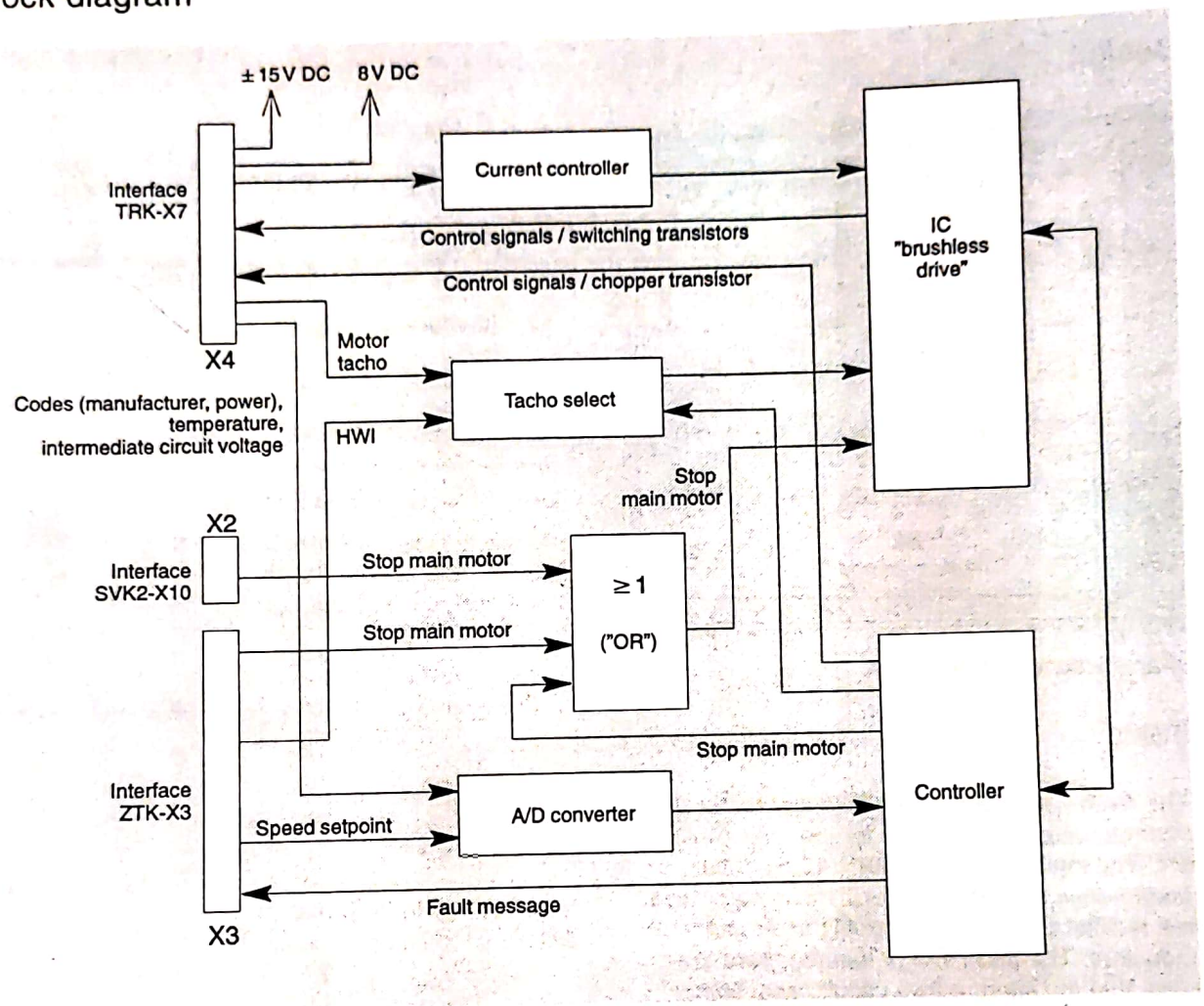
The MRK is connected with the central control board ZTK through a parallel interface. The signals transmitted via this interface include:

- enabling of main motor M1
- enabling of the operating modes "Inching" and "Run".

During the initialization of the main drive the MRK first tests itself. Then the transistor control board TRK and the motor M1 are tested.

With the help of the code resistors on the TRK and in the main motor M1 the control unit on the MRK identifies the parameters for closed-loop control of the main drive.

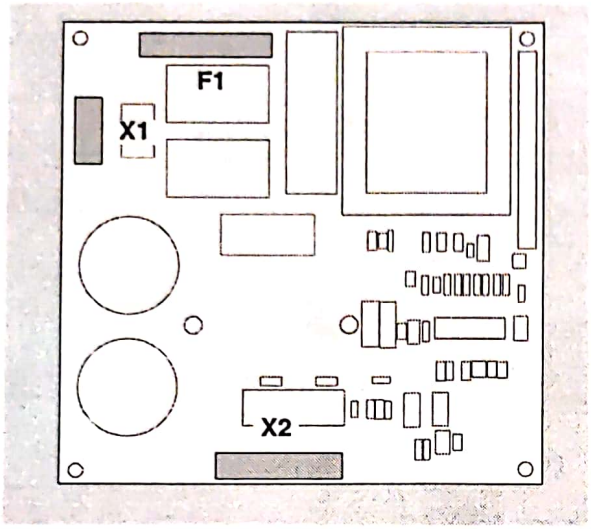
Block diagram



Block diagram: MRK

NEK Mains electronic board

Design



Mains electronic board NEK

Fuse

F1 Fuse input voltage (16AT)

Plug connectors

X1 Power supply from terminal strip X1

X2 Interface to TRK-X2

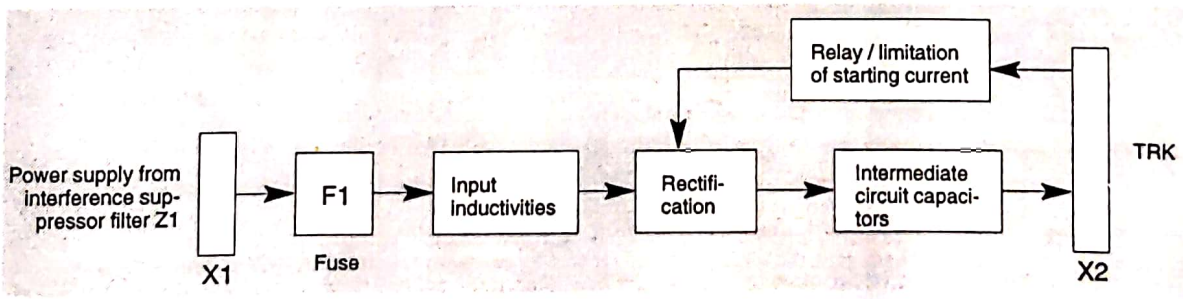
Task

The mains electronic board NEK generates the intermediate circuit voltage for the main motor M1. The input voltage of 230V AC from the interference suppressor filter Z1 is transmitted to the rectifier via a fuse F1 (16AT) and input inductors. The 380V DC generated there are smoothed by intermediate circuit capacitors.

The relay jumpering the resistor which limits the starting current is located on the NEK and controlled by the TRK.

The NEK is a component of the transistor control module TRK2.

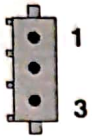
Block diagram



Block diagram: NEK

Pin assignment

Plug connector X1



Pin	Function	
1	⏚	
2	N	230 V AC
3	L1	

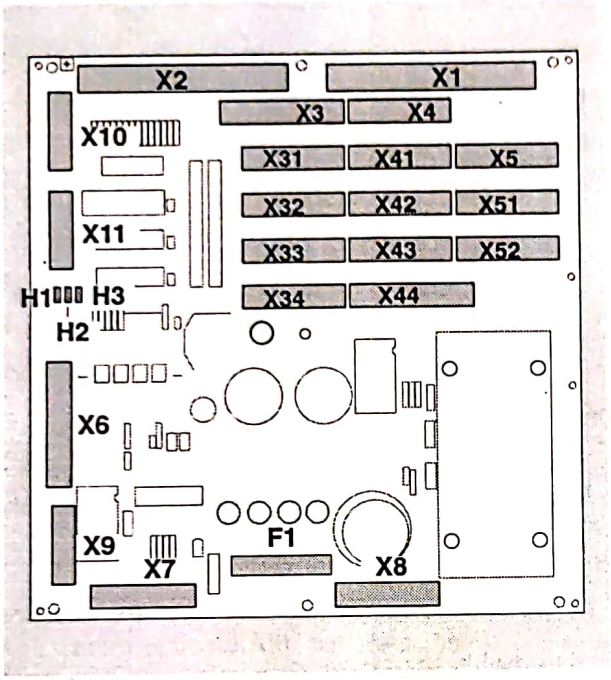
Plug connector X2

Pin	Function
1	+15V DC [1]
2	Control of relay / limitation of starting current [1] (ground, if controlled)
3	+ 18V DC [1]
4	
5	380 V DC [2]
6	⏚ [1]

[1] measure at plug, TRK-side
[2] measure at plug, NEK-side

SVK2 Control voltage distributor board2

Design



Control voltage distributor board SVK2

Fuse F1

– Fuse 3.15 A for secondary side T1

Warning LED H1 (red)

lights up:

– if more than one guard is open (exception: guard of dampening system and guard of plate cylinder count as one guard (one position switch))
– briefly during the initialization
– if motor is not allowed to turn
– in the case of an emergency stop

Warning LED H2 (red)

lights up:

– briefly during the initialization
– if one guard is open (exception: guard of dampening system and guard of plate cylinder count as one guard (one position switch))
– if inching mode is possible

LED H3 (red)

– without function

Plug connectors

X1 data line to ZTK-X1
X2 data line to ZTK-X2
X3 inuts and outputs operator side
X4 inputs and outputs drive side
X5 inputs and outputs drive side
X6 to ZTK-X7
X7 to T1-X19, to HTB emergency stop, to P1
X8 to pile feeder and delivery
X9 to HVK-X3
X10 to MRK-X2
X11 to SKM
X31, X32, X33, X34
inputs and outputs operator side
X41, X42, X43, X44
inputs and outputs drive side
X51 +24V DC
X52 not used

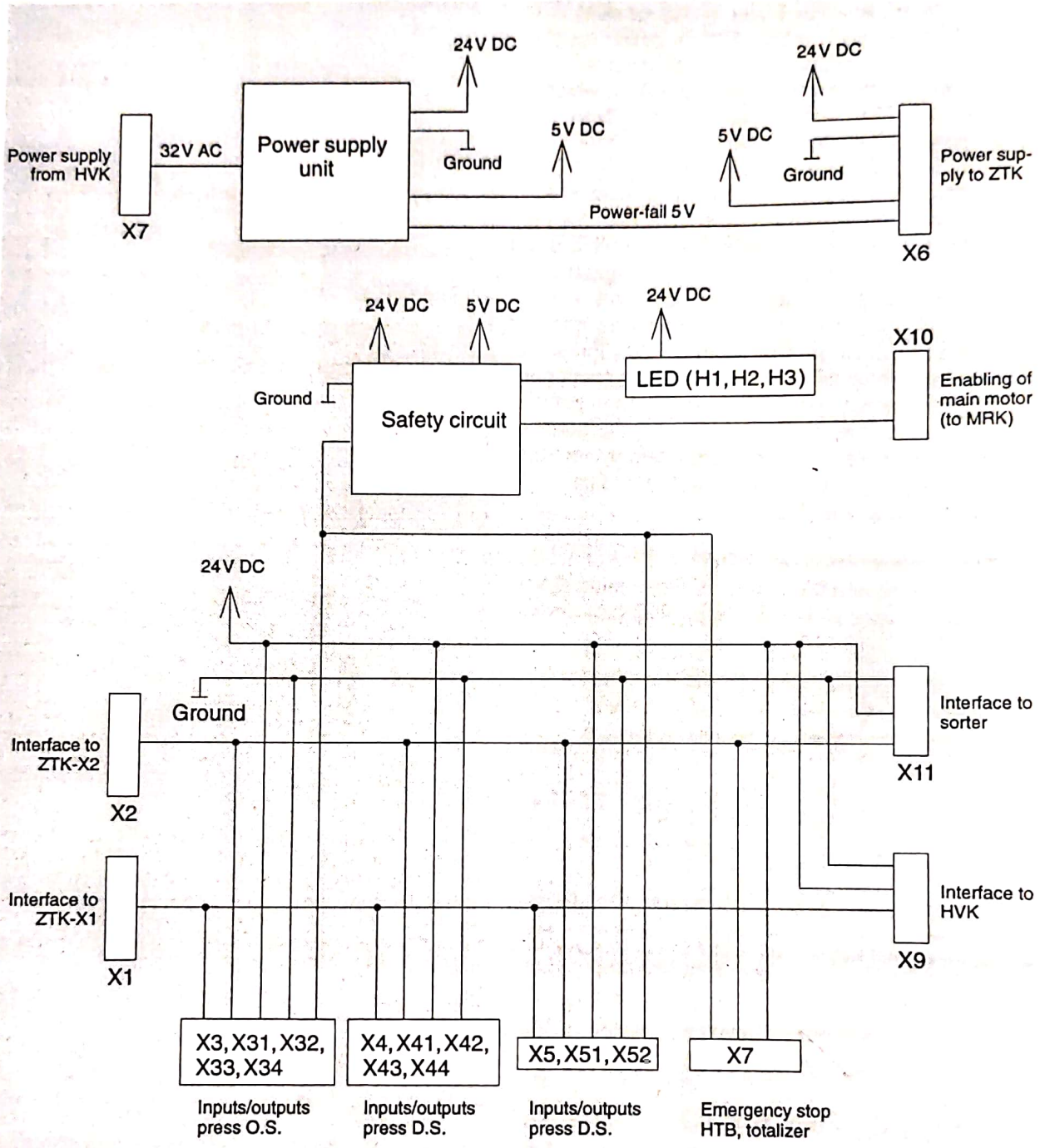
Task

From the transformer T1 the SVK2 receives 32V AC. This voltage is rectified in the power supply unit. From the rectified voltage two chopper regulators generate 24V DC and 5VDC, which also supply the ZTK. In the case of undervoltage, the 5V power-fail signal is reset (0V).

All inputs and outputs of the printing press are connected to the SVK2. The signals from the NO contacts of the safety inputs are transmitted directly to the ZTK and evaluated there. The signals of the NC contacts of the safety inputs are evaluated in the safety circuit with the help of a hard-wired logic on the SVK2. Depending on the inputs, the signal "Inching with limitation" (1 guard open; exception: guard of dampening system and guard of plate cylinder count as one guard) or "Stop" (2 guards open; exception: guard of dampening system and guard of plate cylinder count as 1 guard) is transmitted to the MRK.

The data exchange regarding the state of the inputs (to the ZTK) and the control of the outputs (from the ZTK) takes place via two parallel data lines.

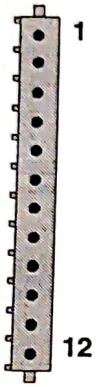
Block diagram



Block diagram: SVK2

Pin assignment

Plug X3



Pin	Function
1	Guard of blanket cylinder S1 (only 1-colour presses)
2	Overshooting control S21
3	Guard of plate cylinder and guard of dampening system S3
4	Guard of inking unit S4
5	Sensor pile height control at delivery B1
6	–
7	Crank handle at feeder S19
8	Crank handle at delivery S20
9	–
10	–
11	Sensor pile raising at feeder B2
12	–

Plug X4

Pin	Function
1	Dryer on/off
2	Dryer temperature +/–
3,4,5	–
6	Front alignment VD (B4)
7	Double-sheet VD (B5)
8	Inking form roller Y9 (only 2-colour presses)
9	Plate cylinder – blanket cylinder PU2 Y8 (only 2-colour presses)
10	Opening the front clamping bar Y11 (only 2-colour presses)

Plug X5

Pin	Function
1,2	–
3	–
4	Unlock tool barrier Y24 (only 1-colour presses)
6,7,8	–
9,10	–

Plug X6

Pin	Function
1,2	+ 5V DC
3,4	+ 24V DC
5	Power-fail 5V
6,7,8	Ground
9	Ground
10,11	–
12	–

Plug X7

Pin	Function
1	Emergency stop HTB S7
2	Emergency stop HTB S7
3	Totalizer
4,5,6	+ 24V DC
7,8	–
9,10	32V AC

Plug X8

Pin	Function
1	–
2	Ground
3	–
4	Ground
5	+ 24V DC
6,7	Ground
8	+ 5V DC
9	Ground
10	–

Plug X31

Pin	Function
1	–
2	Ink ductor Y14 (only 2-colour presses)
3	Opening the front clamping bar Y6
4	–
5	Pressure switch S24
6	Condensate drain valve Y19
7	Ink ductor Y13
8,9	–
10	Guard of inking unit PU2 S5 (only 2-colour presses)

Plug X32

Pin	Function
1	Encoder / triple-speed shaft B6
2	Guard of printing unit O.S. S6
3	–
4	+ 24V DC
5	Dryer temperature +/–
6	–
7	Dryer on/off
8,9	+ 24V DC
10	–

Plug X33

Pin	Function
1	Pile too high at feeder S17
2	Pile too low at delivery S18
3	Guard of dampening system S2 (only 2-colour presses)
4	Guard of inking unit S5 (only 2-colour presses)
5,6,7	–
8	Guard of blanket cylinder S1 (only 1-colour presses)
9	Guard of dampening system S2 (only 2-colour presses)
10	Guard of plate cylinder and guard of dampening system S3

Plug X34

Pin	Function
1	Guard of inking unit S4
2	Guard of printing unit O.S. S6
3,4	–
5,6	+ 24V DC
7	–
8	+ 24V DC
9	Ground
10	+ 24V DC

Plug X41

Pin	Function
1	Opening the rear clamping bar PU2 Y12 (only 2-colour presses)
2	Numbering device / perforating disc
3	Throwing the numbering device on/off Y20
4	Advancing the numbering device on/off Y22
5	Detection of numbering device (connected or not)
6,7	–
8	Plate cylinder – blanket cylinder Y1
9	Blanket washup device on/off Y5
10	–

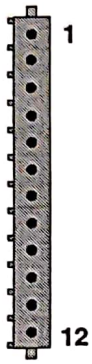
Plug X42

Pin	Function
1	Detection of dryer (connected or not)
2	Fault message of dryer
3	Inking form roller on/off Y3
4	+24V DC
5	Blanket cylinder – impression cylinder Y2
6	+24V DC
7	Dampening form roller on/off Y4
8	+24V DC
9	–
10	Feeder / enabling of suction air Y16

Plug X43

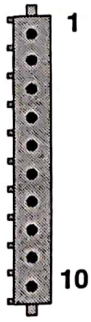
Pin	Function
1	Delivery / descent release Y17
2	Feeder lift release Y18
3	–
4	Opening the rear clamping bar Y7
5,6	–
7,8	–
9	Detection of tape inserter (connected or not)
10	Button for tape insertion

Plug X44



Pin	Function
1	Tape inserter / tape cutter
2	Tape inserter / transport motor
3	Autoplate PU1–PU2 S22 (only 2-colour presses)
4	PU2 thrown on/off S23 (only 2-colour presses)
5,6	–
7	Dampening form roller on/off PU2 Y10 (only 2-colour presses)
8	Powder magnet
9	Opening the front clamping bar Y6
10	+24V DC
11	Ground
12	+24V DC

Plug X51



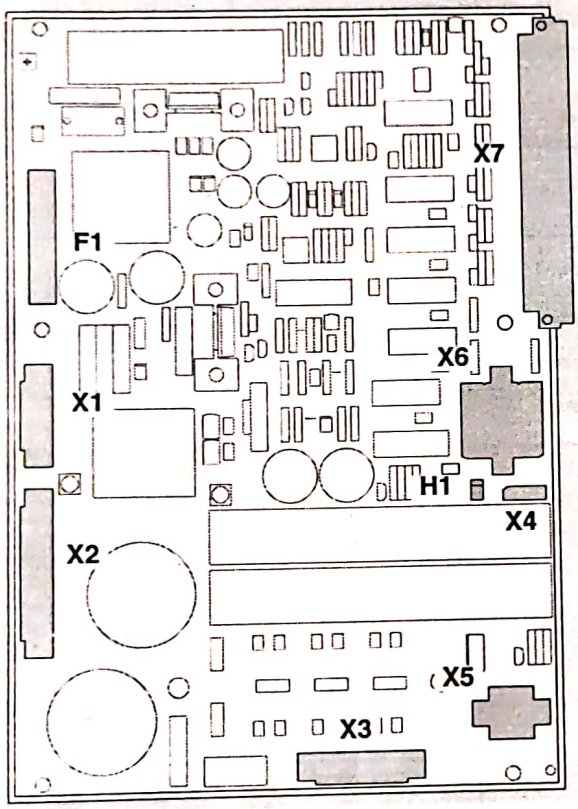
Pin	Function
1,2,3	–
4	+24V DC
5,6,7	–
8,9,10	–

Plug X52

Pin	Function
1,2,3	–
4,5	–
6,7,8	+24V DC
9,10	–

TRK Transistor control board

Design



Transistor control board TRK

Fuses

F1 Fuse 0.8 AT for chopper-type power supply unit.

Monitoring LED

H1 15 V DC from chopper-type power supply unit

Plug connectors

X1 Not used

X2 From NEK-X2

X3 To main motor M1

X4 To temperature sensor of heat sink (TRM)

X5 Not used

X6 Interface to rotor position encoder of main motor M1

X7 Interface to MRK-X4

Task

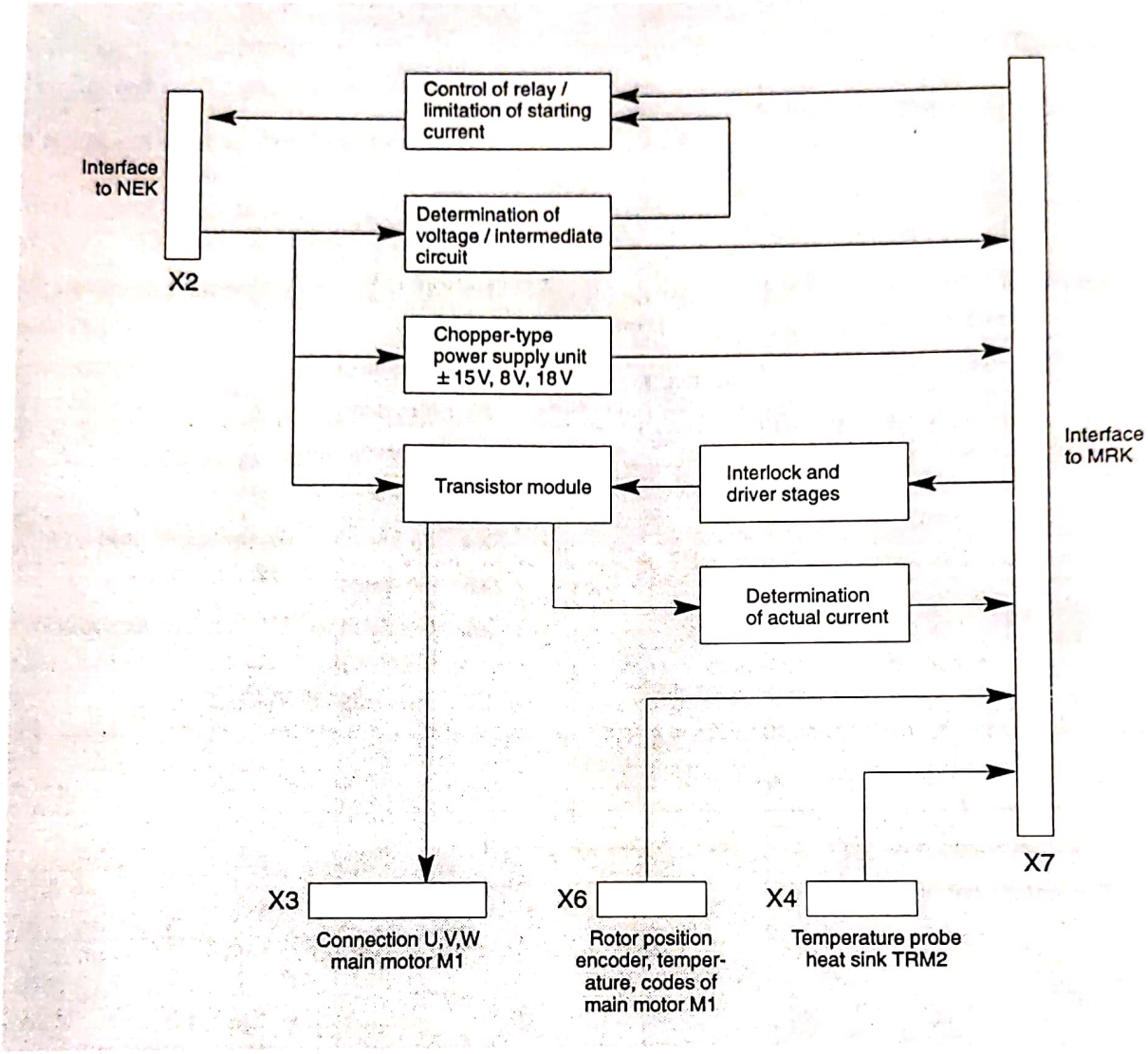
The TRK comprises the transistor module of the bushless main drive. From the NEK it receives the intermediate circuit voltage of 380V DC required to drive the motor and as supply voltage for the chopper-type power supply unit. 6 driver stages control the switching transistors which are soldered to the TRK, but not located on it. The actual current is registered and evaluated on the MRK. If the intermediate circuit voltage is too low when the main motor is started up, the relay limiting the starting current is actuated by the TRK.

The MRK receives the temperature of the transistor control module TRM2, the signals of the rotor position encoder and the temperature and codes of the main motor M1.

If the chopper transistor switches the voltage through, the braking energy can be reduced in the chopper resistor on the TRK. This limits the intermediate circuit voltage.
The chopper-type power supply unit on the TRK generates ± 15V (TRK, MRK), 8V (MRK) and 18 V DC (NEK,TRK). It is protected by the fuse F1. As long as the chopper-type power supply unit is in operation, the green LED is lit.

The TRK is a component of the transistor control module 2.

Block diagram



Block diagram: TRK

Pin assignment

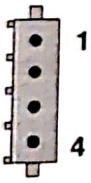
Plug X1

Pin	Function
1	–
2	↓ 12 V DC
3	

Plug X2

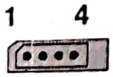
Pin	Function
1	+15V DC
2	Control of relay (ground, if controlled)
3	+ 18V DC
4	↑ 380 V DC
5	
6	⏚

Plug X3



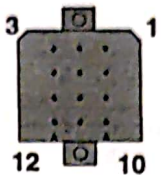
Pin	Function
1	PE (green-yellow)
2	Motor winding U (yellow)
3	Motor winding V (black)
4	Motor winding W (green)

Plug X4



Pin	Function
1,2	Ground
3,4	Temperature of heat sink

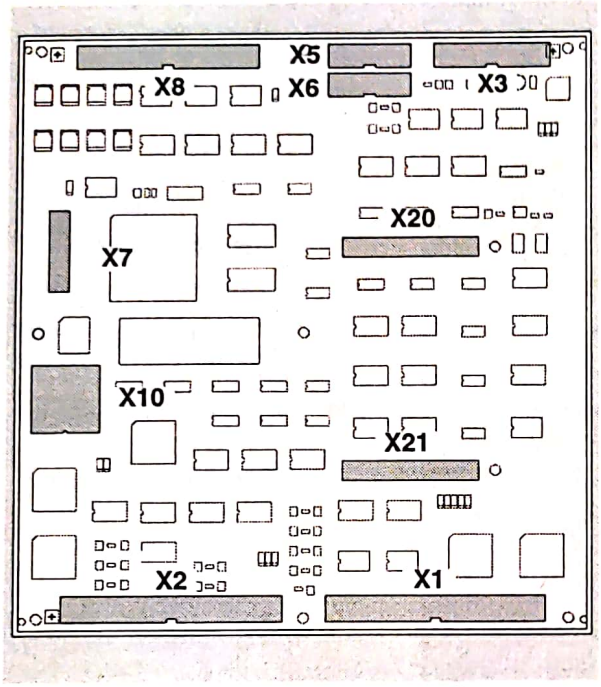
Plug X6



Pin	Function
1	Hall signal A (blue)
2	Hall signal B (green)
3	Hall signal C (yellow)
4,5	–
6	+ 15V DC (brown)
7	Ground (black)
8	Shield (orange)
9	Ground (grey)
10	Temperature of motor (pink)
11	Power code 1.2kΩ (white)
12	Manufacturer code 27kΩ (red)

ZTK Central control board

Design



Central control board ZTK

Plug connectors

X1 Data line to SVK2-X1
X2 Data line to SVK2-X2
X3 Data line to MRK-X3
X5 Not used
X6 Not used
X7 Supply voltage from SVK2-X6
X8 Data line to main control panel HTB
X10 Data line of encoder HWI
X20 Not used
X21 Not used

Task

The central control board ZTK comprises the master computer of the electronic control system. This computer consists of the CPU, EPROM, RAM and NV-RAM. The CPU controls the address data bus for the Eprom, RAM and the drivers for the data bus and address bus.

Via the in- and out-ports the inputs from the SVK2 are read and the outputs to the SVK2 are controlled. The ZTK controls, for instance, the point of time when the powder spray device and pump for suction and blast air are switched on and off as well as the pile at the feeder and delivery and the impression control mechanism ("Impression on", "Impression off").
The safety inputs (guards and emergency stop) of the printing press are monitored by the ZTK and also by the SVK2. If a safety input is actuated during operation, the printing press stops as quickly as possible.

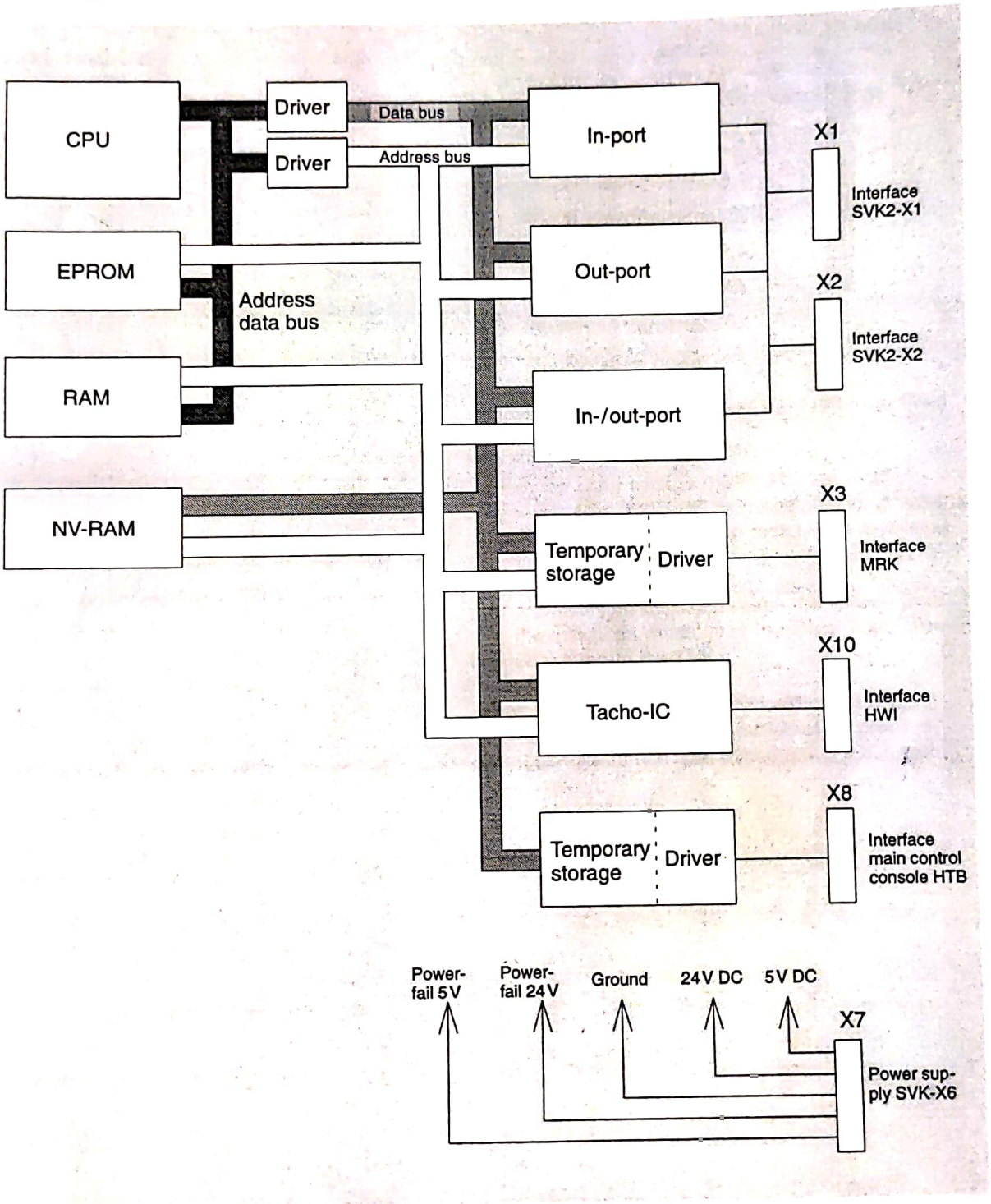
Via the interface to the motor control board MRK the ZTK specifies the speed setpoint and direction of rotation and, if necessary, the press angle for the main motor M1. In the event of malfunctions of the main motor the MRK transmits the fault messages to the ZTK.

The encoder HWI is connected directly to the ZTK and transmits track A, track B and the zero pulse. On the basis of these values, the ZTK determines the speed, direction of rotation and the current press angle.

From the main control console HTB the ZTK receives the commands which are entered. It controls the displays of the control console.

From the control voltage distributor board SVK2 the ZTK receives 24 V DC and 5 V DC. If the voltages are too low, power-fail signals are transmitted.

Block diagram



Block diagram: ZTK

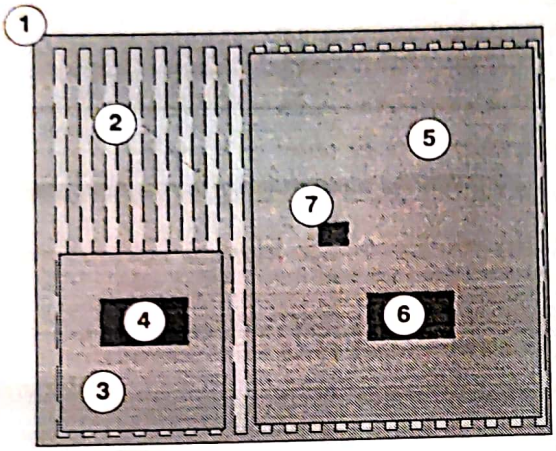
Pin assignment

Plug X7

Pin	Function
1	+24V DC
2,6	Ground
3	Power-fail 5V
4,5	+5V DC
7,8,9	–
10	–

TRM2 Transistor control module 2

Design and task



Transistor control module 2 TRM2

The transistor control module 2 consists of:

① Support plate
② Heat sinks
③ Mains electronic board NEK
④ Rectifier
⑤ Transistor control board TRK
⑥ Switching transistors
⑦ Temperature probe

The individual components of the TRM2 are fitted on the support plate.

From the input voltage (230V AC) the rectifier generates the 370V DC intermediate circuit voltage required to control the main motor. The rectifier is soldered to the NEK.

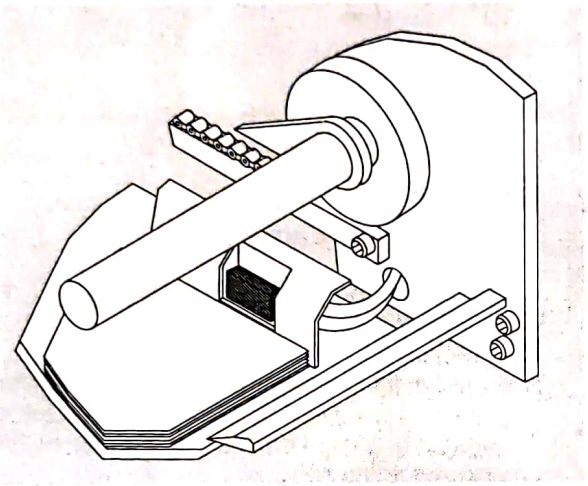
The switching transistors switch the voltage through to the individual windings of the main motor. They are soldered to the TRK.

The heat sink dissipates the heat of the rectifier and switching transistors. The temperature probe which measures the heat sink temperature is connected to the TRK.

Sensors

B1 Pile height control at delivery

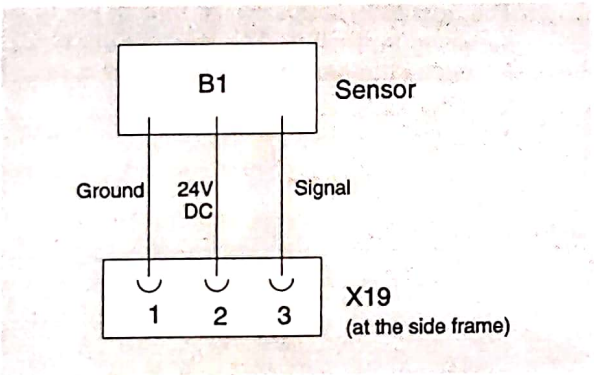
Location and task



Sensor B1 at delivery, O.S.

The sensor "Pile height control at delivery" B1 is located on the O.S. of the delivery. The capacitive sensor comprises an amplifier and an indicator LED. If the sensor detects paper, the LED is lit and the pile is lowered by approx. 1 cm. The sensor is adjustable for height.

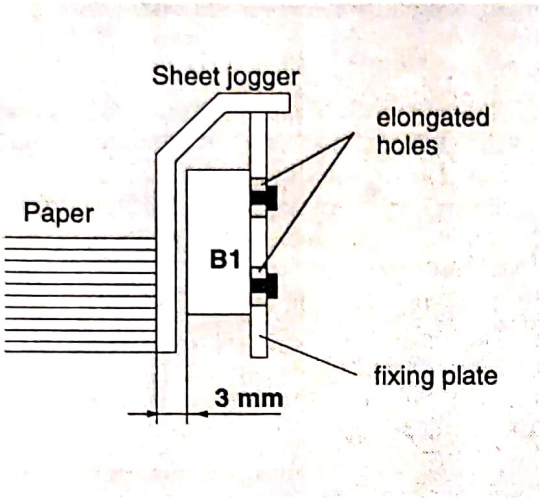
Connection



Connection of sensor B2

Signal	Function
1 (24V DC)	Paper in front of sensor
0 (0V)	No paper in front of sensor

Adjustment



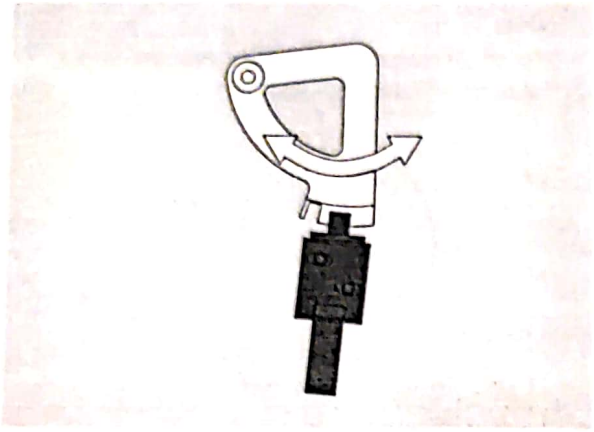
sensor B1

The elongated holes in the fixing plate makes the sensor adjustable for height. Fix the sensor approximately in the middle of the holes.

Note:
The sheet jogger is in contact with the paper, the sensor is set back by 3mm.

B2 Pile raising at feeder

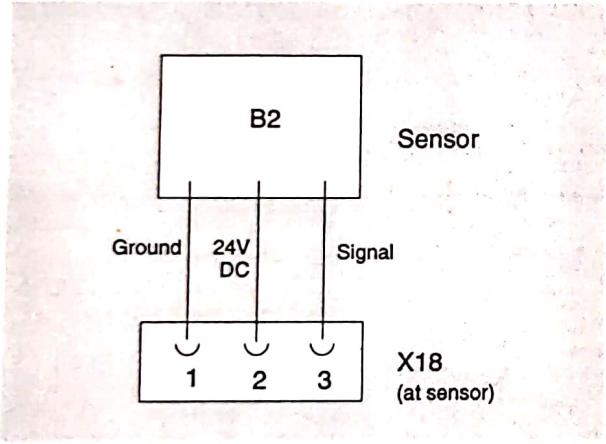
Location and task



Pile raising at feeder, O.S.

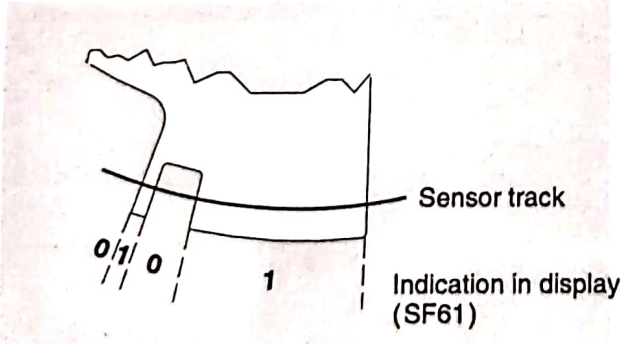
The sensor "Pile raising at feeder" B2 is located on the O.S. of the feeder, below the covering. It supplies pulses which are evaluated by the ZTK. On this basis pile raising at the feeder is controlled, i.e. the feeder pile is inched up depending on the paper consumption.

Connection and signal ranges



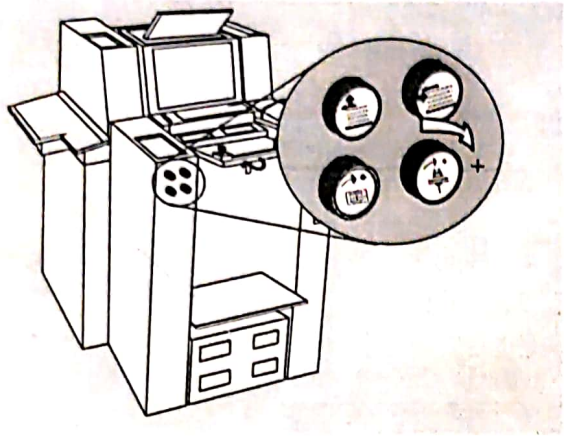
Connection of sensor B2

Indication in display (SF61)	Output signal sensor	Function
0	24V DC	Sensor not damped
1	0V	Sensor damped



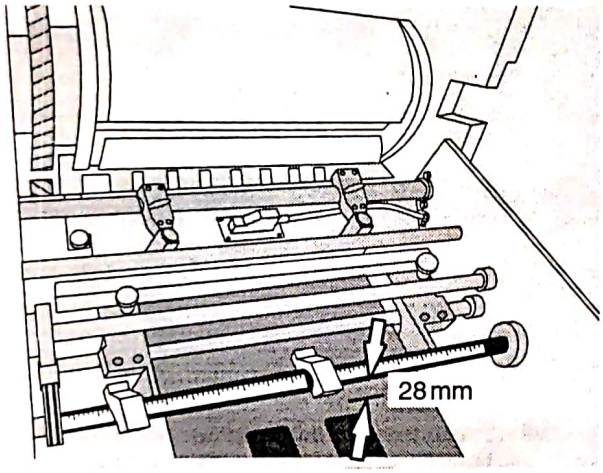
Signal ranges of sensor B2

Adjustment



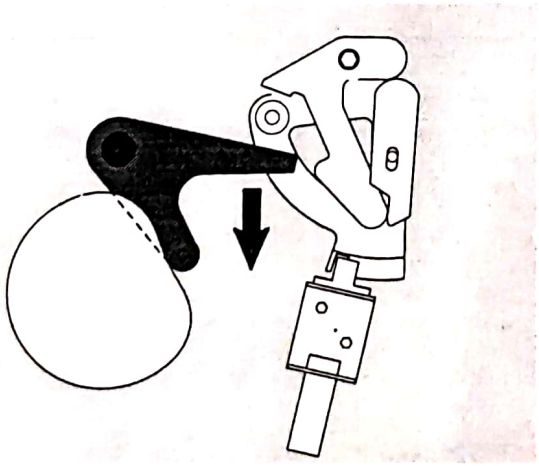
Pile height adjustment at feeder

❶ Turn the rotary button for pile height adjustment fully through to "+".



Cross bar at feeder

❷ Use the crank handle at the feeder to adjust the feed board in such a way that the distance between the feed board (without paper) and the cross bar is 28 mm.



Pile height adjustment at feeder

❸ Call up special function SF62 to display the press angle.

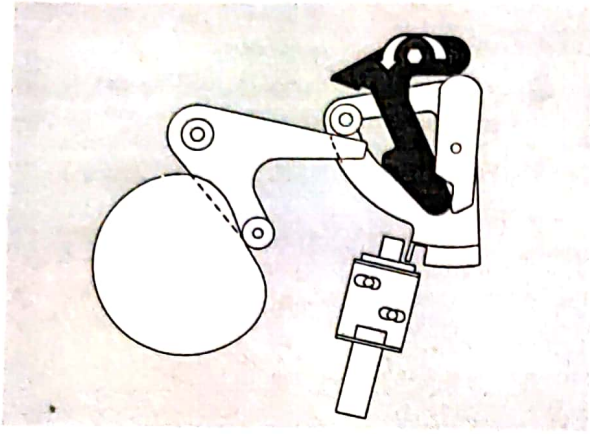
S → 6 2

Turn the press to 207° ±1° by means of the crank handle.

Note:

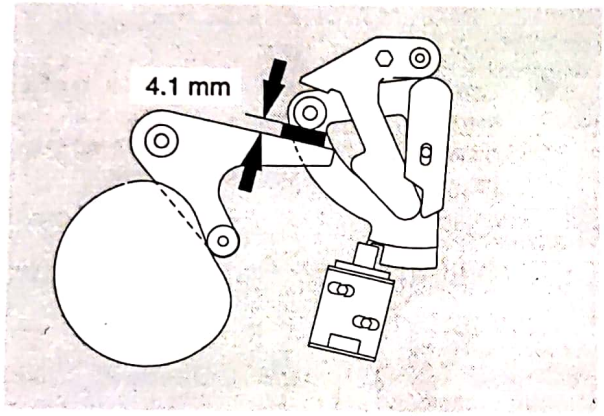
If the press has been switched off, it must first be turned past the zero point (zero pulse).

The dark lever is in its lowest position.



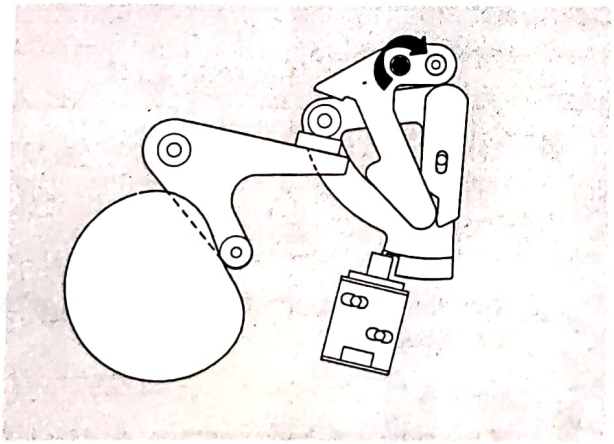
Control cam

❹ Loosen the screw marked in the illustration. The dark lever can now be moved.



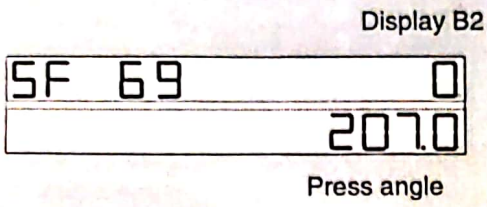
Control cam

❺ Place a spacer piece of 4.1 mm between the levers as shown in the illustration.

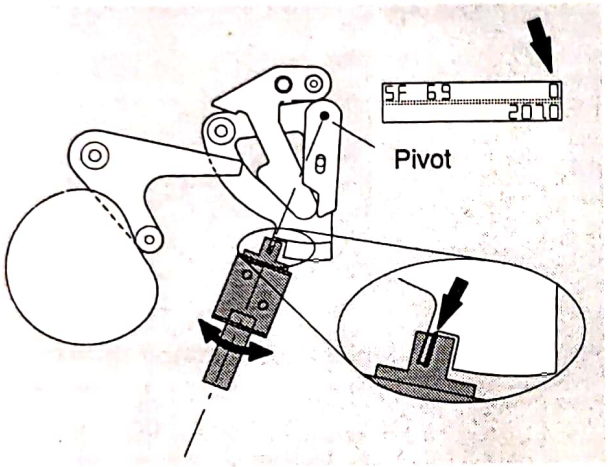


Control cam

❻ Press the cross bar for pile sensing onto the feed board and tighten the marked screw.



Display of sensor B2



Sensor B2 with control cam

❼ Call up special function 69 to display the encoder "Pile raising at feeder" B2:

S → 6 9

Display B2:

1 ≙ damped (metal plate in sensor)

0 ≙ not damped

❽ Move the sensor B2 in such a way that the display of B2 jumps between "0" and "1" at the edge shown in the enlargement. Simultaneously, the sensor must be in alignment with the pivot (see illustration). Tighten the snesor. Remove the 4.1 mm spacer piece.

❾ You can check the adjustment by pressing the button "Run" twice.

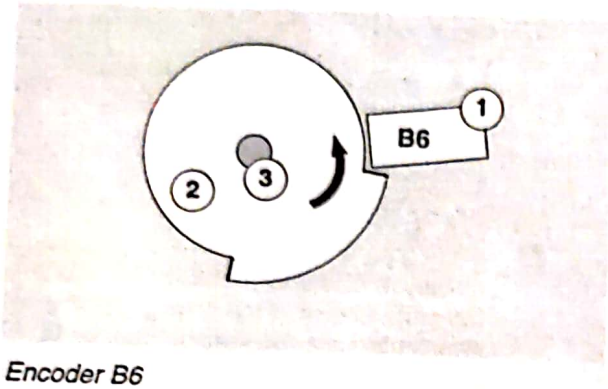
If the adjustment is okay, "Good" will appear in the display. If "High", "Lo" or "Deep" appears, repeat the adjustment. Press the "Stop" button.

❿ Press the button "S" to return to the normal display mode.

Note:
In the dynamic condition at 8000 i.p.h., the distance between the feed board and cross bar is 25.5 ± 1 mm.

B6 Encoder of triple-speed shaft

Location and task

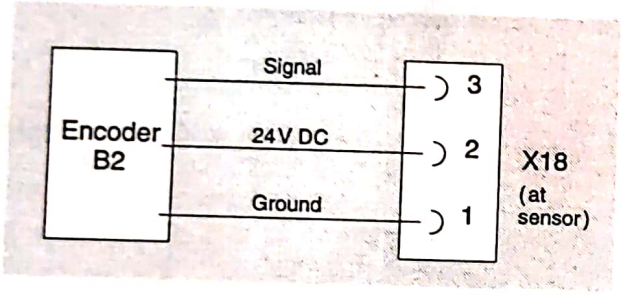


Encoder B6

The encoder B6 is located on the operator side of the printing press behind the control cabinet. It registers the edges of the segment disk and converts them into electrical pulses. With the help of these pulses it is possible to determine the mechanical adjustment of the circumferential register.

① Encoder
② Segment disk
③ Fixing bolt

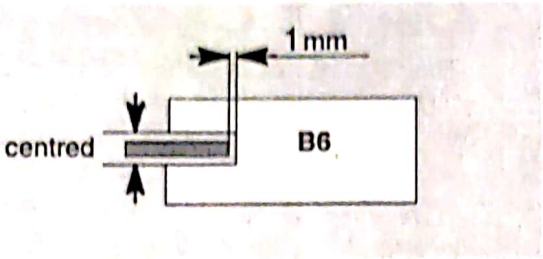
Connection



Connections of encoder B6

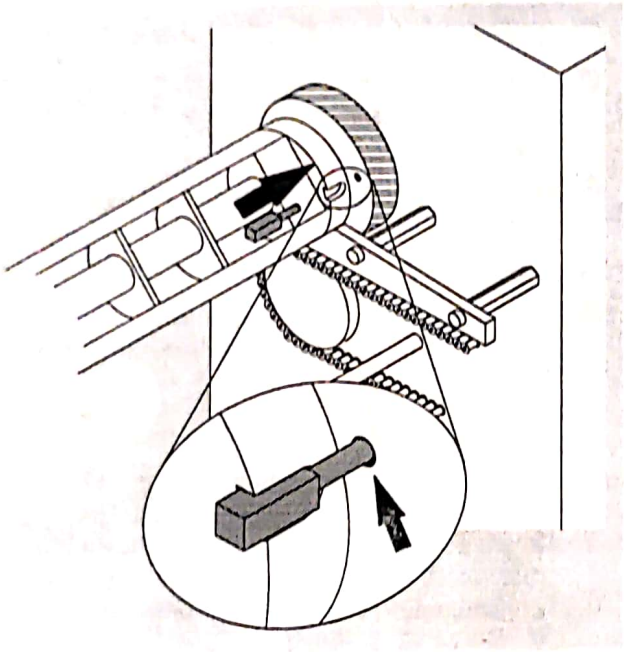
Signal	Function
1 (24V DC)	Sensor not damped
0 (0V)	Sensor damped

Adjustment



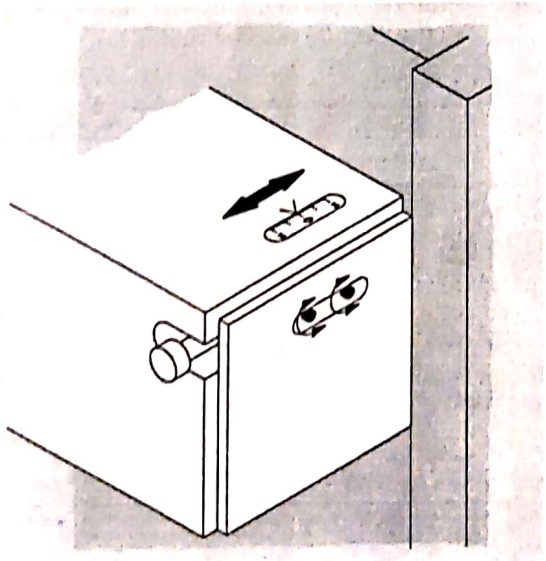
Alignment of sensor in relation to segment disk

1. Align the sensor in such a way that the segment disk runs in the middle of the recess of the sensor and the distance to the sensor is 1 mm.
2. Turn the press to 0° with the crank handle and insert the positioning pin (see page 4.31).



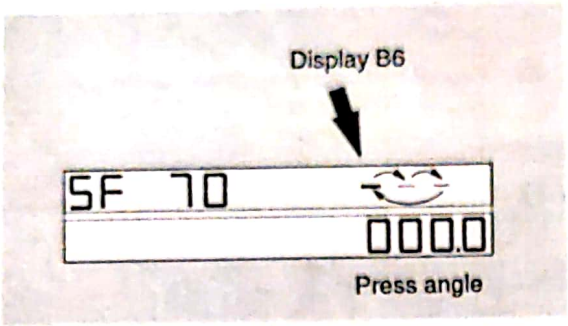
Zeroing thr circumferential register

3. Zero the circumferential register with the help of the positioning bolt.

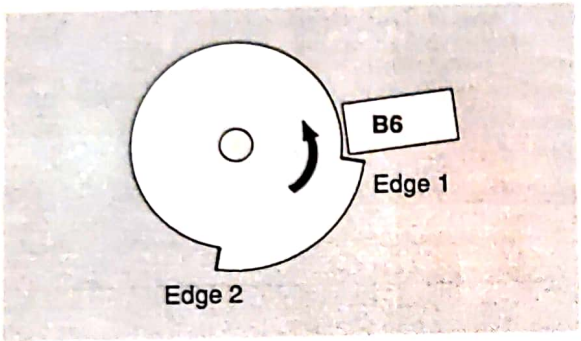


Zeroing the scale of the circumferential register

4. Readjust the scale for the circumferential register, if necessary.
5. Take out the positioning bolt.



Display on control console



Encoder B6

❻ Call up special function 70:

S → 7 0

The circuit states of the encoder "Synchronization" B6 are displayed (cross segment).

❼ Loosen the fixing bolt of the segment disk.

❽ Turn the segment disk until edge 1 causes the cross segment in the display to jump to the next number.

❾ Tighten the fixing bolt without turning the segment disk.

❿ Take out the positioning pin.

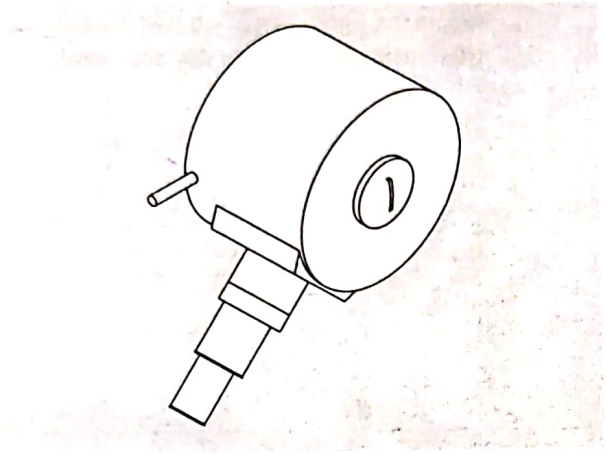
⓫ Press the button "Run" twice to start the printing press and check the adjustment.

In the display the deviation from the ideal position is indicated in increments. The tolerance is max. –5 ... +5. If the deviation exceeds 6 or more increments, repeat the adjustment. Press the "Stop" button.

⓬ Press the special function button "S" to return to the normal display mode.

HWI Encoder

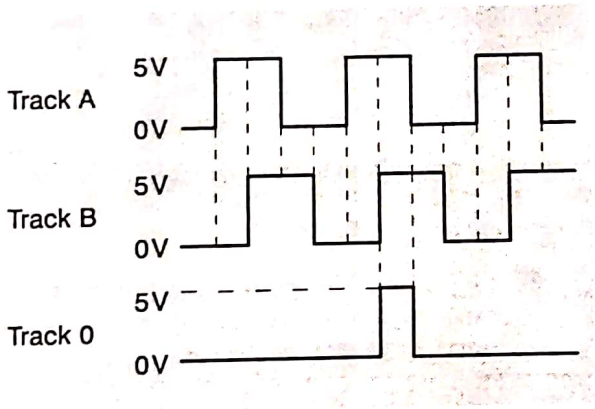
Location and task



Encoder HWI

The encoder is located at the side frame on the operator side and is accessible after removal of the control cabinet.

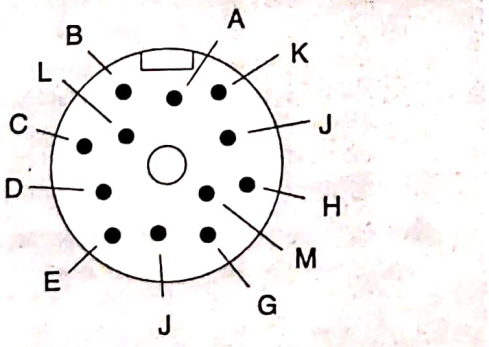
It transmits the pulse signals to the ZTK which are required to determine the speed and direction of rotation of the printing press. The major components of the encoder are a light source, an optical sensor and a rotating disc which is divided into 1024 segments.



Pulse signals of the encoder

The encoder generates 3 pulse signals: track A, track B and track 0. Track B is staggered by 90° in relation to track A.
Track 0 receives the zero pulse which is generated once per rotation.
Of all 3 tracks the inverted signals are available as well.
Per rotation 1024 pulses are generated on track A and B each. They are transmitted to the ZTK.

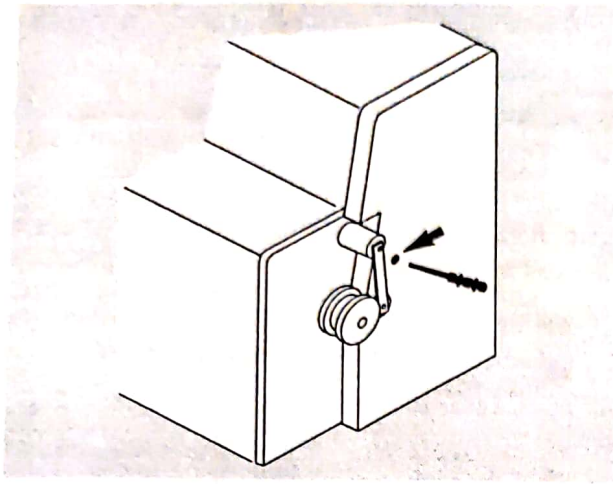
Pin assignment



Plug X21

Pin	Function
M,G,H	+5V DC
A,L,D	M5 (0V)
C	Track /A
B	Track A
F	Track /B
E	Track B
K	Track /0
J	Track 0

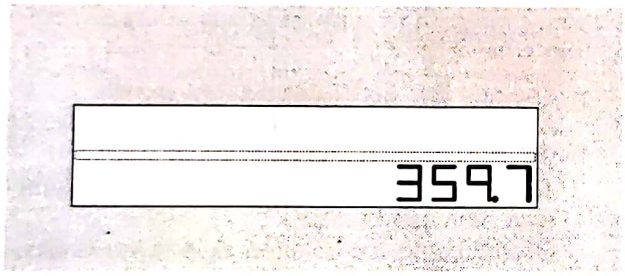
Adjustment



Printing press, D.S.

❶ Insert the locating bolt in the borehole of the side frame.

❷ Turn the press using the crank handle until the locating bolt fixes the printing press in position (bolt slides further into the borehole).



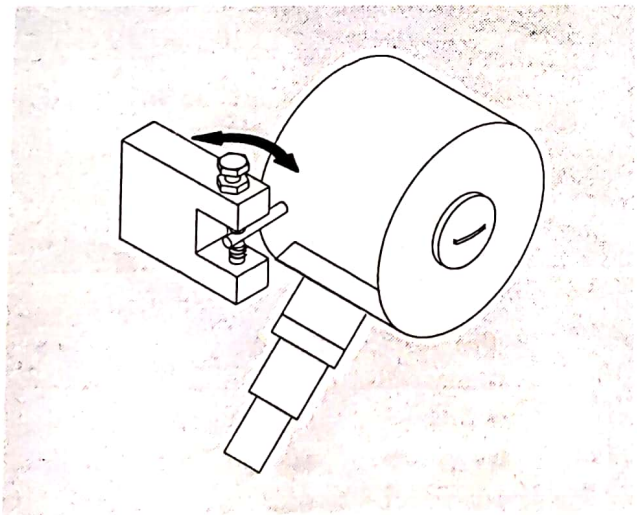
Degree indication in display

❸ Call up special function 60 to display the press angle.

S → 6 0

Note:

If the press has been switched off, it must first be turned past the zero point (zero pulse).



Adjusting screw at HWI

❹ If possible, set the press to exactly 0° by means of the HWI adjusting screw. Points 5 and 6 can then be omitted.

If the 0°-setting is not possible, turn the HWI adjusting screw to its central position.

❺ Loosen the HWI, set to approx. 0° and tighten it again.

❻ Set to exactly 0° by means of the adjusting screw.

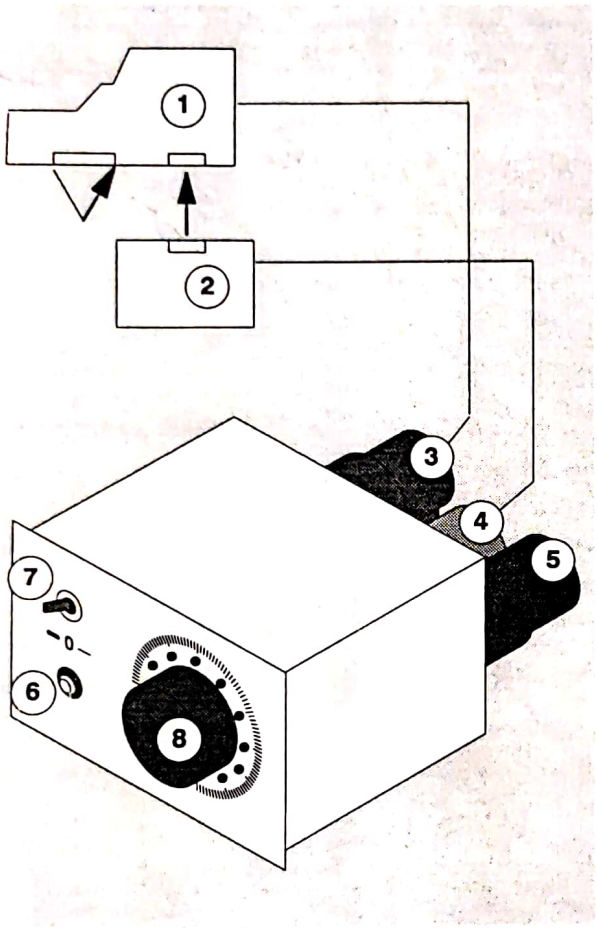
Note:

When the locking nut is tightened, the adjusting screw also turns; to compensate for this, it can be useful to set the press to 359.9°. After tightening the locking nut, you then obtain 0.0°.

❼ Press the button "S" again to return to the normal display mode.

VD Front alignment control, double-sheet control

Design



Front alignment and double-sheet control

① Receiver of double-sheet control and reflex sensor of front alignment control B4

② Transmitter of double-sheet control B5

③ Plug connector X2 to receiver of double-sheet control and reflex sensor of front alignment control B4

④ Plug connector X1 to transmitter of double-sheet control B5

⑤ Plug connector X16 to SVK2-X4

⑥ LED for adjustment of double-sheet control

⑦ Selector switch for operating mode:
- 0 "Double-sheet/front alignment control off"
- – "Thin print sheet"
- ▬ "Thick print sheet"

⑧ Rotary button for adjustment of the sensitivity for the different paper thicknesses

Task

The reflex sensor at the front alignment control monitors the paper run (sheet feeding).

The sensor system of the double-sheet control with transmitter and receiver:
- monitors sheet feeding at the feeder,
- passes light through the paper,
- detects multiple sheets.

Note:
The transmitter emits light and the receiver of the double-sheet control transmits its signals to the electronics of the front alignment and double-sheet control VD. The amplitude of the receiver signal depends on the thickness and nature of the printing material.

The electronics of the front alignment and double-sheet control VD:
- supplies the sensors B4 and B5 with operating voltage.
- evaluates the signals of B4 by two electronic circuits working independently of each other.

Adjustment

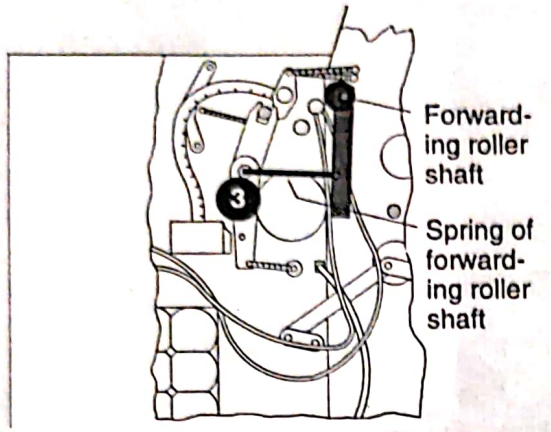
1. Place a sheet on the feeder pile.
2. Press the button "Double-sheet positioning run" twice.
   The sheet goes into the adjustment position.
3. Turn the rotary button to the left stop.
4. Selector switch in position "Thin print sheet –": LED is lit.
5. Turn the rotary button until the LED goes off. Continue turning clockwise for 10 more graduation marks. Skip points 6, 7 and 8.

   If the LED does not go off:
6. Turn the rotary button to the left stop.
7. Turn the selector switch to the position "Thick print sheet –".
8. Turn the rotary button until the LED goes off. Continue turning clockwise for 10 more graduation marks.
9. Press the button "Double-sheet positioning run" again. The sheet is fed in and transported to the delivery.

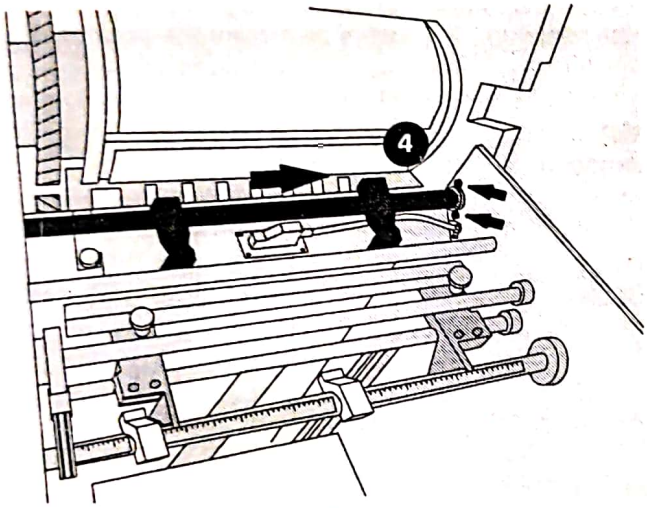
Note:

If, during production run, normal sheets cause a press stop because a double-sheet was erroneously detected, you can turn the rotary button clockwise for up to 15 graduation marks.

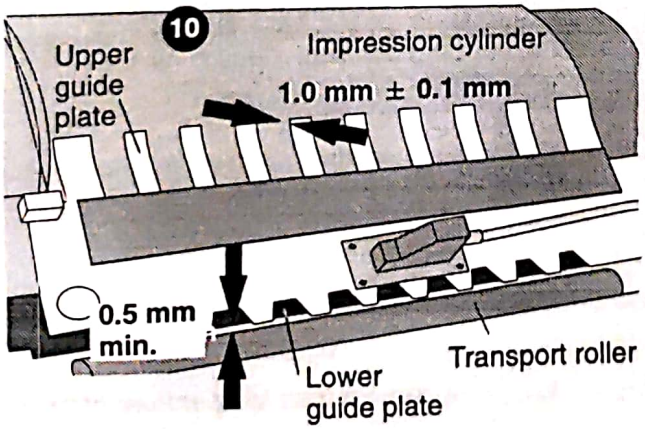
Removal and installation of transmitter B5



Printing press, feeder D.S.



Feeder with forwarding roller shaft



Guide plates at feeder

Removal

1. Switch off the main switch.
2. Remove the guard on the D.S..
3. Remove the spring of the forwarding roller shaft on the D.S..
4. Loosen both screws of the bearing bush of the forwarding roller shaft at the side frame D.S. (inside) and pull out the forwarding roller shaft laterally. When inserting the forwarding roller shaft make sure the forwarding rollers are on the correct side (it might be helpful to mark them with D.S. and O.S.).
5. If the press is equipped with a static electricity eliminator, disconnect the connecting cable of the neutralizer bar from the connection box and lead it inside through the opening in the side frame.
6. Disconnect the transmitter B4 plus cable fixing element and lead it outside through the side frame.
7. Loosen the screws at the upper guide plate and remove the plate.
8. Loosen the 2 fixing bolts on each the D.S. and O.S. and pull out the lower guide plate towards the feeder. The transmitter B5 is now accessible.

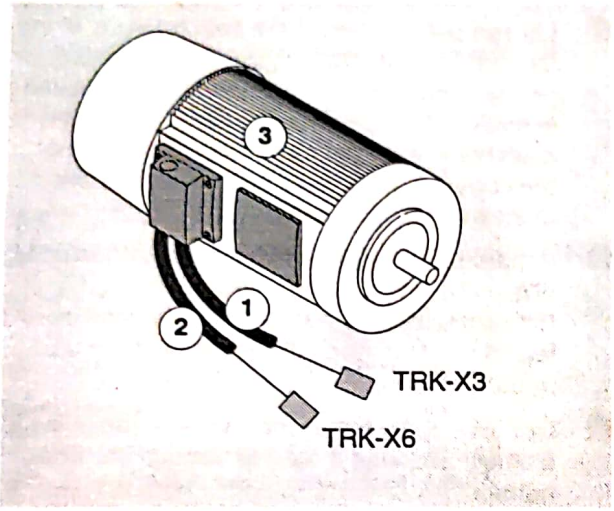
Installation

9. Put the lower guide plate back in place and fasten it by means of the 2 screws on the D.S. and O.S..
10. Put the upper guide plate back in place, but before tightening the screws check the following distance, e.g. by inserting sheets or cardboard of corresponding thickness: upper guide plate – impression cylinder:1.0 mm ± 0.1 mm. Check whether the distance between the lower guide plate and transport roller is at least 0.5 mm.
11. Connect the static electricity eliminator, when present. Fix the forwarding roller shaft plus forwarding rollers (make sure the forwarding rollers are on the correct side). Insert the spring of the forwarding roller shaft on the D.S..

Motors

M1 Main motor

Design



Main motor M1

① Motor cable to TRK-X3

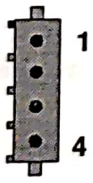
② Control cable to TRK-X6

③ Brushless main motor M1

Power:	2 kW
Stator:	3 windings (U/V/W)
Rotor:	shaft with permanent magnets with alternating magnetization.
Hall sensors:	3 sensors determine the position of the rotor of the main motor M1 (signals A/B/C).
Motor temperature:	3 PTC thermistors register the motor temperature. At 100°C the motor is shut down by the CPTRONIC control system.
Cables:	control and motor cables are firmly connected to the motor via two 1.6 m long cables with plug connections at their ends.

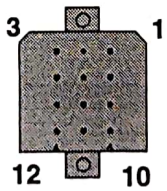
Pin assignment

Plug X3



Pin	Function
1	PE (green-yellow)
2	Motor winding U (yellow)
3	Motor winding V (black)
4	Motor winding W (green)

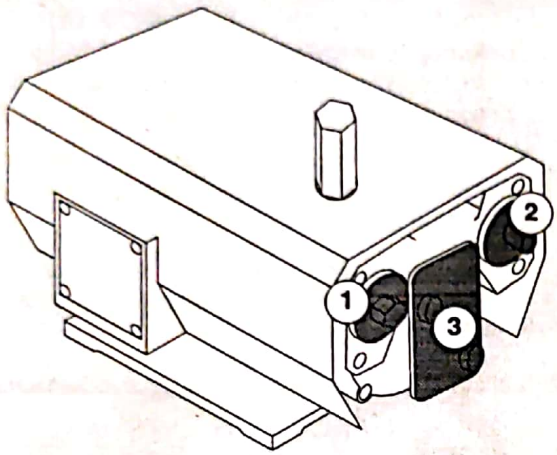
Plug X6



Pin	Function
1	Hall signal A (blue)
2	Hall signal B (green)
3	Hall signal C (yellow)
4	–
5	–
6	+ 15 V DC (brown)
7	Ground (black)
8	Shield (orange)
9	Ground (grey)
10	Motor temperature (pink)
11	Power code 1,2 kΩ (white)
12	Manufacturer code 27 kΩ (red)

M2 Pump for suction and blast air

Design and task



Pump for suction and blast air M2

① Filter for suction air;
vacuum limiting valve –0.5bars

② Filter for blast air;
pressure limiting valve +0.3bars

③ Filter for air intake

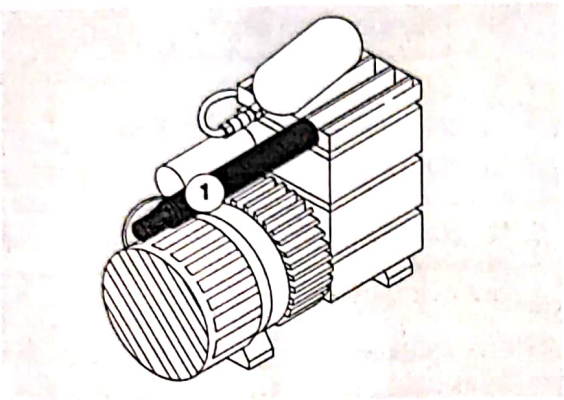
The pump for suction and blast air M2 supplies the following components at the feeder with suction or blast air:

- suckers
- lateral sheet separation blowers
- rear edge blowers
- blower bar at front edge

The pump for suction and blast air is switched on and off simultaneously with "Production run on/off".

M3 Compressor "Pneumatic system"

Design



Compressor "Pneumatic system" M3

① Filter cartridge

The compressor "Pneumatic system" M3 is a 230 V AC motor which is independent of the direction of rotation. It must not start up against pressure.

If the permissible temperature is excceded, the compressor switches off automatically and on again after cooling down.

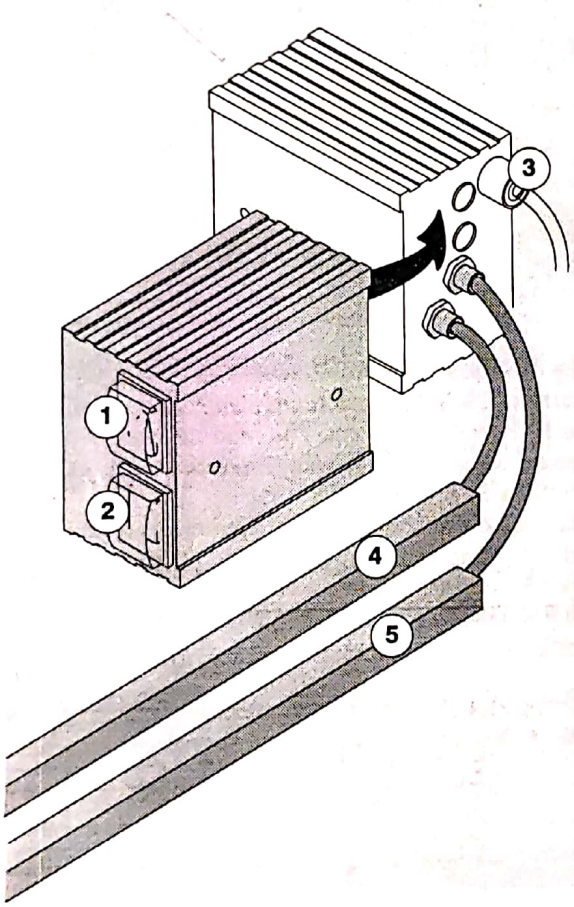
The filter cartridge must be checked weekly and if it is very soiled it must be replaced (filter fineness 10 µm).

Other equipment

E2 Static electricity eliminator

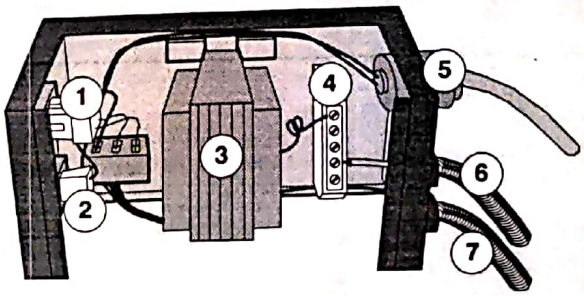
Design and task

The static electricity eliminator E2 consists of a power supply unit with high-voltage transformer and two neutralizer bars connected to it. These bars eliminate static charges on the sheets. One neutralizer bar is located at the feeder and the other one at the delivery of the printing press. Clean the neutralizer bars with a brush or compressed air every week. Switch the static electricity eliminator off for this purpose.



Static electricity eliminator

① Mains switch
② Signal lamp
③ Power cable 220V AC
④ Neutralizer bar at feeder
⑤ Neutralizer bar at delivery

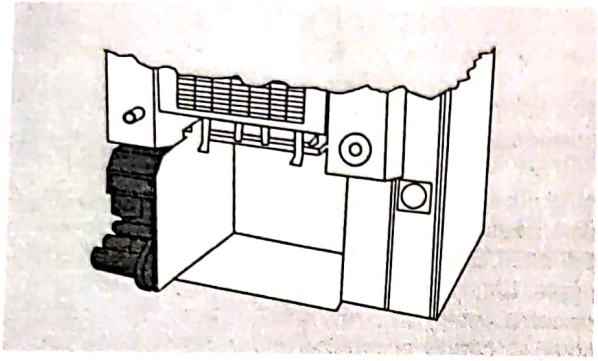


Power supply unit

① Mains switch
② Signal lamp
③ High-voltage transformer
④ Connection of neutralizer bars
⑤ Power cable 220V AC
⑥ Incoming cable / neutralizer bar at feeder
⑦ Incoming cable / neutralizer bar at delivery

E3 Powder spray device

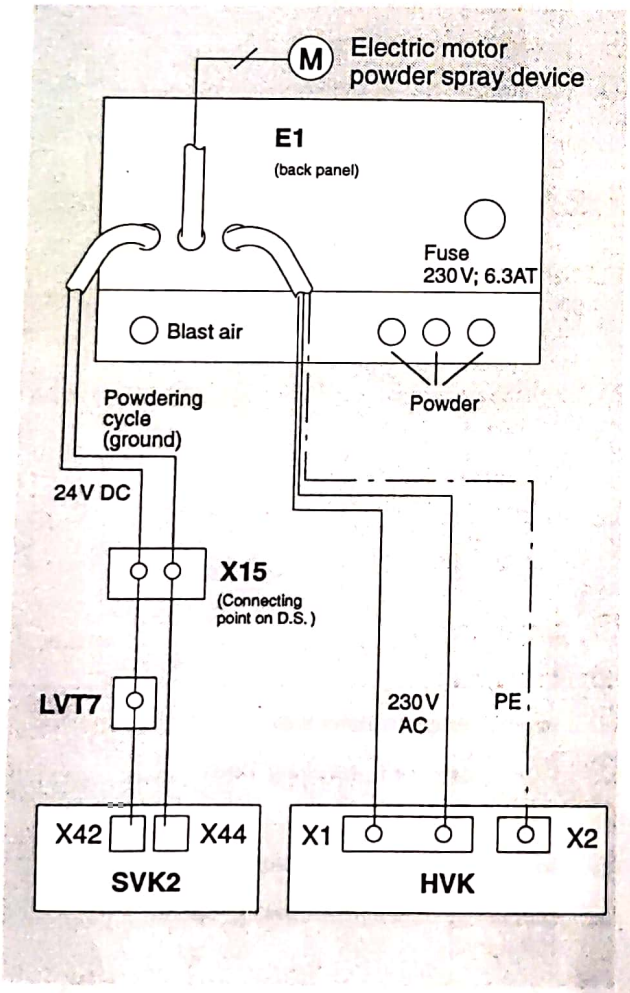
Location



Location of powder spray device, delivery

The powder spray device is located on the D.S. of the delivery.

Connection



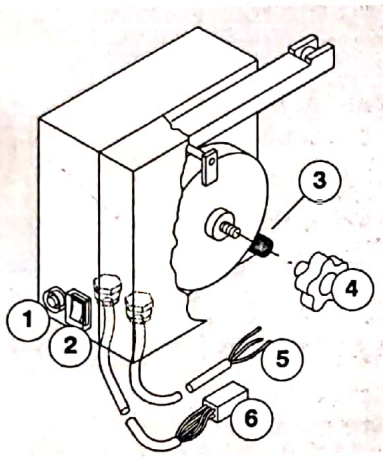
Connections of powder spray device

The electric motor of the powder spray device requires 230V AC, which are switched on and off on the HVK via a contactor. The motor is switched on and off simultaneously with "Production run on" and "Production run off".
The signal "Powdering cycle" controls the solenoid valve in the powder spray device. It is generated by the ZTK and transmitted to the powder spray device via the SVK2. Control is effected depending on the press angle and sheet length.

For a description of the powder spray device please refer to the manufacturer's documentation.

E4 Tape inserter

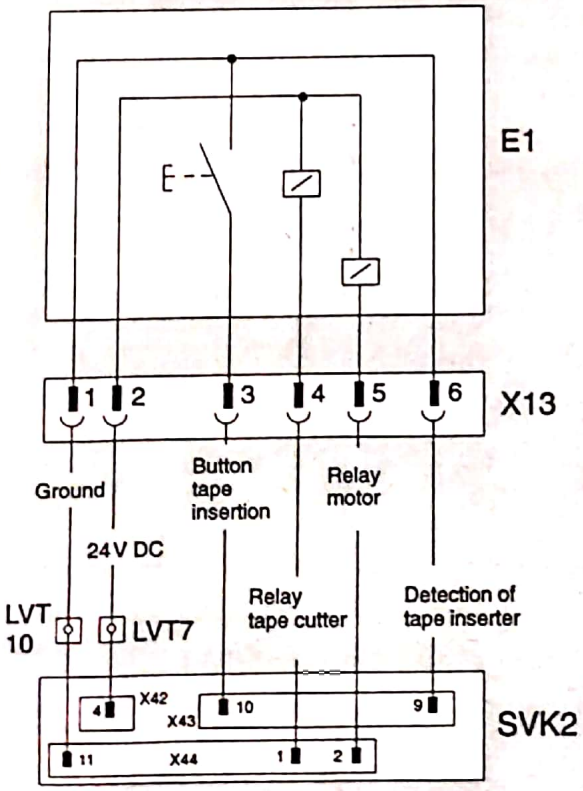
Design



Tape inserter

① Button "Tape inserter"
② Mains switch
③ Fuse 0.8 A
④ Star grip for removal of cover
⑤ Power cable 220 V AC
connection to HVK-X1/X2
⑥ Control cable 24 V DC
connection to plug connector X13

Connection



Connection of tape inserter

E5 Sorter

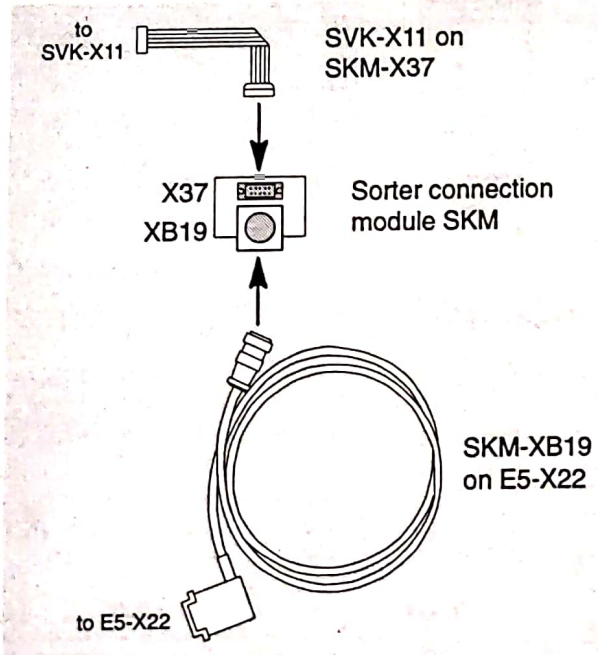
Task

The sorter can be connected at the delivery of the press to separate the print sheets and distribute them to the preset number of trays.

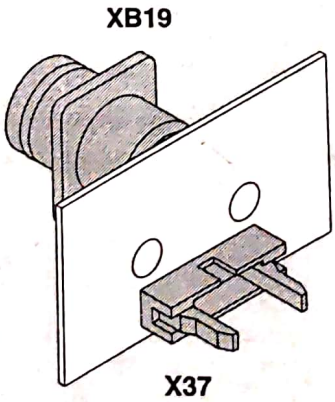
The print sheet is transferred to the delivery where it falls onto the transport tape of the sorter and is forwarded to one of the trays in the sorter tower. The individual trays are controlled by the sorter. If there is a paper jam in the sorter, the printing press receives an interrupt signal and goes off impression. The same signal is emitted if the preset print volume has been printed.
If the press detects a double-sheet, the sorter receives a signal. The ejection flap at the sorter changes its position and the double-sheet falls in the collecting tray.

SK Sorter connection

Design



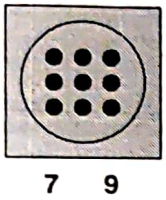
Sorter connection module SKM



Components of sorter connection "EMF Super Sorter"

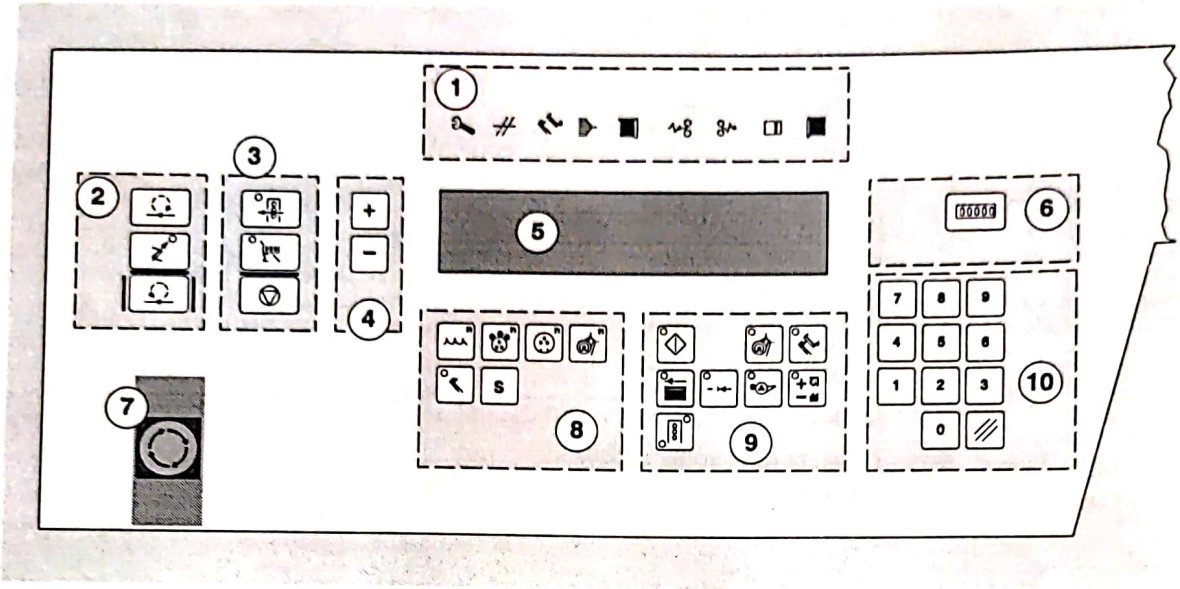
Pin assignment

Plug SKM-XB19



Pin	Function
1	–
2	Paper jam in sorter (sorter feed-control)
3	–
4	Sorter double-sheet control
5,6	–
7	+ 24 V DC
8	Ground
9	End of run / sorter (sorter master-control)

HTB Main control console and S7 emergency stop



Main control console HTB

① Information displays
② Inching mode
③ Automatic
④ ± buttons
⑤ Display
⑥ Button "Premature end of run" (job-end)
⑦ Emergency stop S7
⑧ Preselection
⑨ Direct selection
⑩ Numeric keypad

The individual buttons are described on page 5.2 .

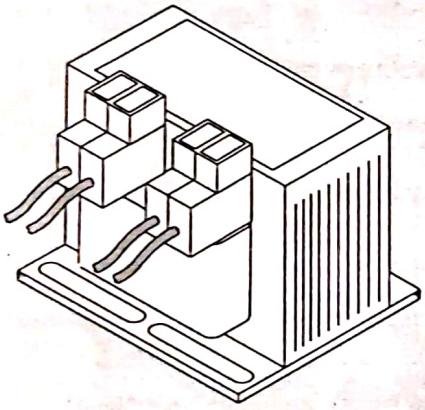
P1 Totalizer

Task

The totalizer P1 counts the printed sheets. It is connected to plug X7 of the SVK2. The counting pulses are generated on the ZTK.

T1 Mains transformer

Design and task



Mains transformer

From 230V AC the mains transformer T1 generates an output voltage of 32V AC for the SVK2. From this voltage 24V DC are generated for the inputs and outputs and 5V DC for the electronic boards. The incoming cables are each protected by a 1.6AT fuse (F6, F7).

Technical data:

Primary winding: U_{pr} = 230V

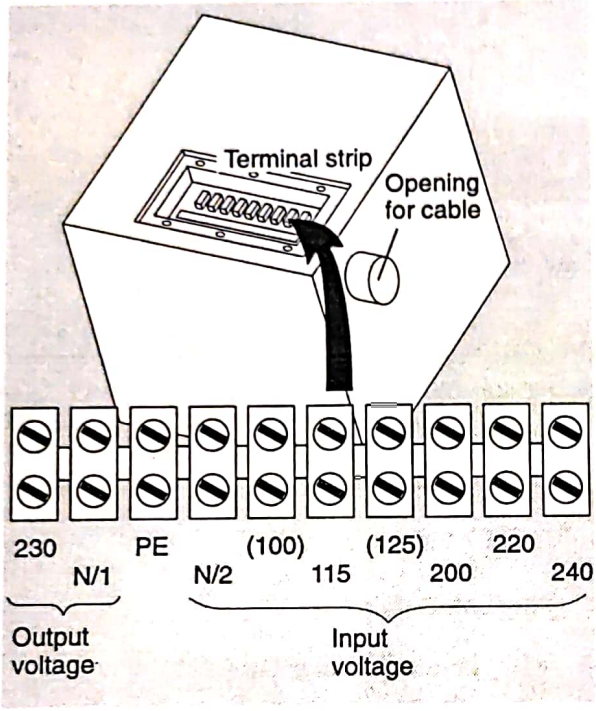
Secondary winding: U_{sec} = 32V

Nominal power: P = 130W

Frequency range: f = 47 ... 63Hz

T2 Matching transformer

Design and technical data



Matching transformer with terminal strip

If the local mains voltage is not 230 V AC, a matching transformer is required. It is fastened to the side frame on the drive side. Connection according to circuit diagram.

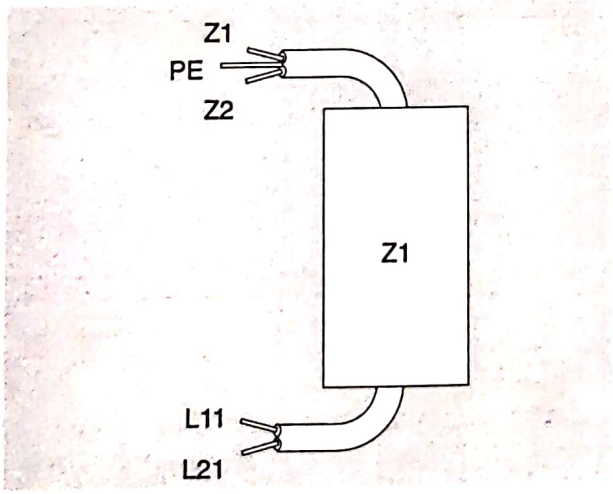
Note:
It is not permitted to connect 100 V AC and 125 V AC!

Technical data:

Input voltage:	115 V AC 200 V AC 220 V AC 240 V AC	} 50/60 Hz
Output voltage:	230 V AC	
Power:	3.7 kW	

Z1 Interference suppressor filter

Design, task and technical data



Interference suppressor filter

The task of the interference suppressor filter is to filter high parasitic frequencies out of the power cable (low-pass filter). It is connected to terminal strip X1 in the control cabinet. Connection according to cable tag.

Technical data:

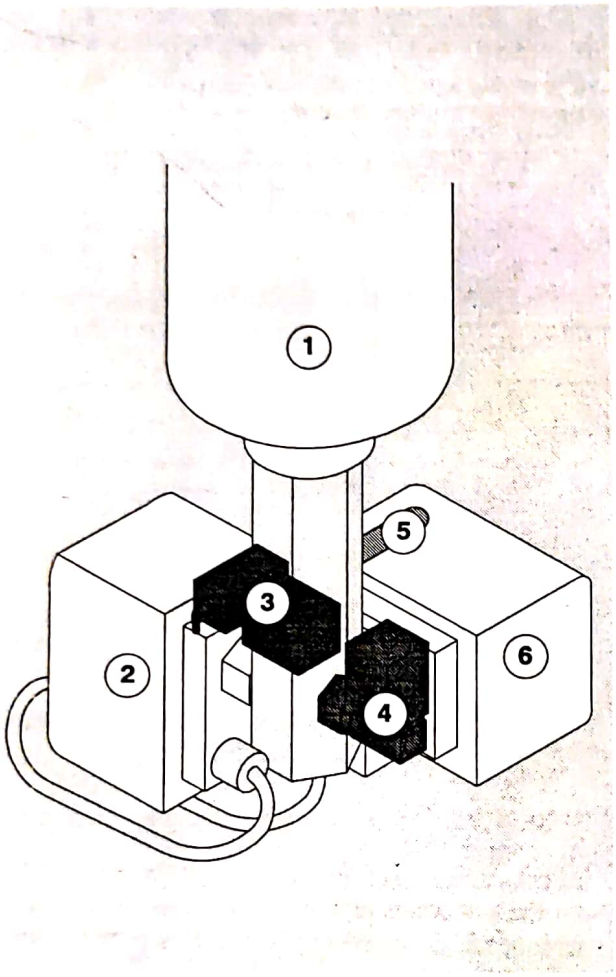
Nominal voltage: 250 V AC, 50/60 Hz

Nominal current: 16 A

Low-pass filter

Pneumatic components

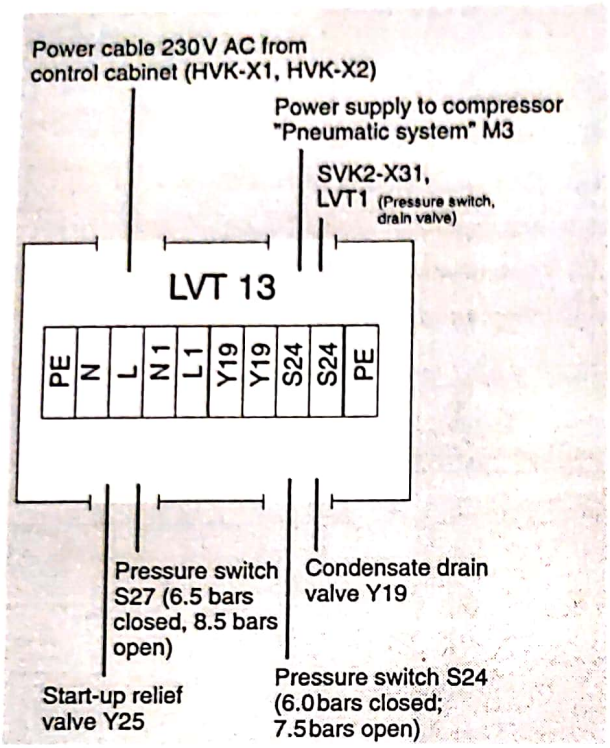
Design



Pneumatic components at the pressure tank

① Pressure tank
② Pressure switch S24
③ Condensate drain valve Y19
④ Start-up relief valve Y25
⑤ Safety valve
⑥ Pressure switch S27

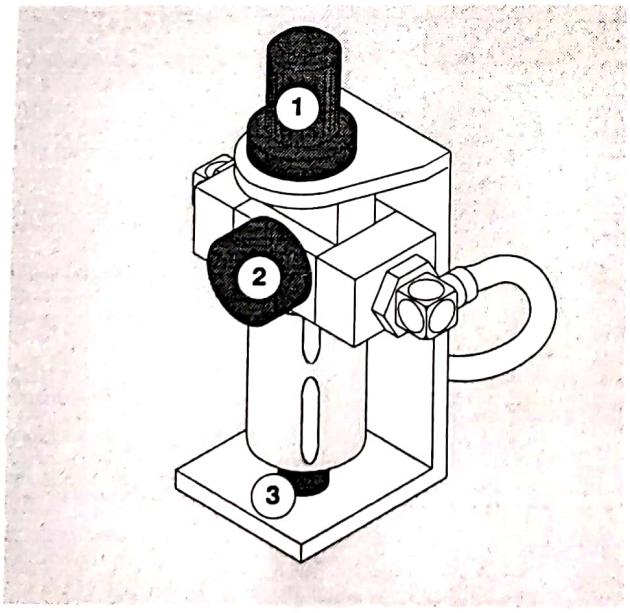
Connections



Distribution box LVT 13

The pressure switches "Pneumatic system" S27 and S24, the start-up relief valve Y25, the condensate drain valve Y19 and the compressor "Pneumatic system" M3 are connected to the distribution box LVT 13. The distribution box LVT 13 is located on the operator side, below the covering of the side frame.

Compressed-air control unit



Compressed-air control unit

At the compressed-air control unit the pressure for the pneumatic valves must be set to 6 bars. If necessary, drain the condensate by opening the screw.

① Adjustment knob
② Pressure indicator
③ Screw for draining the condensate

5. Annex 5.1 – 5.10

Pictograms

Inching mode


Forward


Safe


Backward

Automatic


Production run


Stop


Counter of misprints

± buttons


Plus


Minus

Preselection


Predampening


Inking up the plate


Inking up the blanket


Blanket washup


Automatic ejection of printing plate on/off


Special functions

Direct selection


Run


Blanket washup


Plate change


Blast air/suction air on/off


Double-sheet positioning run


Ink ductor on/off

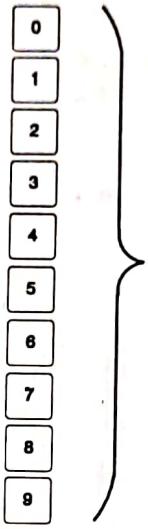

Diagonal register


Selection of printing unit

Counter


Premature end of run (job-end)

Numeric keypad



Input


Delete

Information displays


Service


General malfunction


Plate change


Peripherals


Delivery pile


Paper jam at delivery


Paper jam at feeder


Sheet monitoring


Feeder pile

Abbreviations

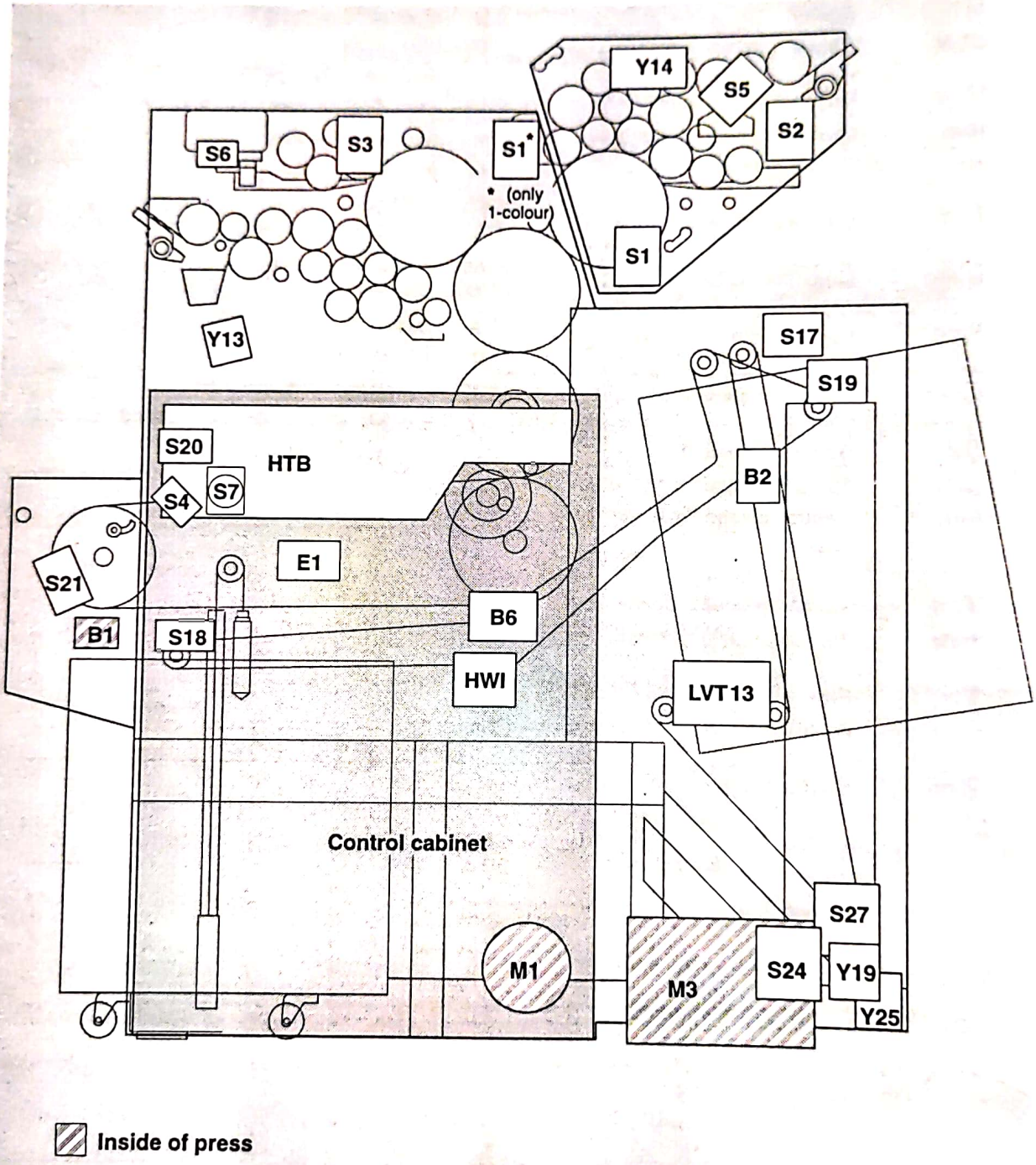
D.S.	Drive side of press
GT	Blanket
GTW	Blanket washup device
HTB	Main control console
HVK	Main current distributor board
HWI	Encoder (tacho)
LVT	Distribution box
MRK	Motor control board
NEK	Mains electronic board
O.S.	Operator side of press
SK	Sorter connection
SKM	Sorter connection module
SVK	Control voltage distributor board
TRK	Transistor control board
TRM	Transistor control module
VD	Front alignment, double-sheet control
ZTK	Central control board

For the general electrotechnical equipment we use the standardized identification letters.

B	Measuring converter
E	Miscellany
F	Protective devices (e.g. fuses)
H	Signalling devices (e.g. lamps)
K	Relays, contactors
L	Inductors
M	Motors
N	Amplifiers, controllers
Q	Power switchgear
R	Resistors
S	Switches
T	Transformers
X	Terminals, plugs, sockets
Y	Electrically actuated mechanisms (e.g. pneumatic valves)

Location diagram

Operator side



Printing press, operator side

Sensors and encoders

B1 Capacitive sensor "Pile height control at delivery"

B2 Encoder "Pile raising at feeder"

B6 Encoder of triple-speed shaft

HWI Encoder

Safety switches

S1 Guard of blanket cylinder (only 1-colour presses) or guard PU2 (only 2-colour presses)

S2 Guard of dampening system PU2 (only 2-colour presses)

S3 Guard of plate cylinder and guard of dampening system

S4 Guard of inking unit

S5 Guard of inking unit PU2 (only 2-colour presses)

S6 Guard of printing unit O.S.

S7 Emergency stop

Position switches

S17 Pile too high at feeder

S18 Pile too low at delivery

S19 Crank handle at feeder

S20 Crank handle at delivery

S21 Overshooting control

S25 Circumferential register, zero position PU2 (only 2-colour presses)

Pneumatic system

S24 Pressure switch "Pneumatic system"

S27 Pressure switch "Pneumatic system"

LVT13 Distribution box "Pneumatic system"

Motors

M1 Main motor

M3 Compressor "Pneumatic system"

Electrically actuated mechanisms

Y25 Start-up relief valve

Y13 Ink ductor on/off

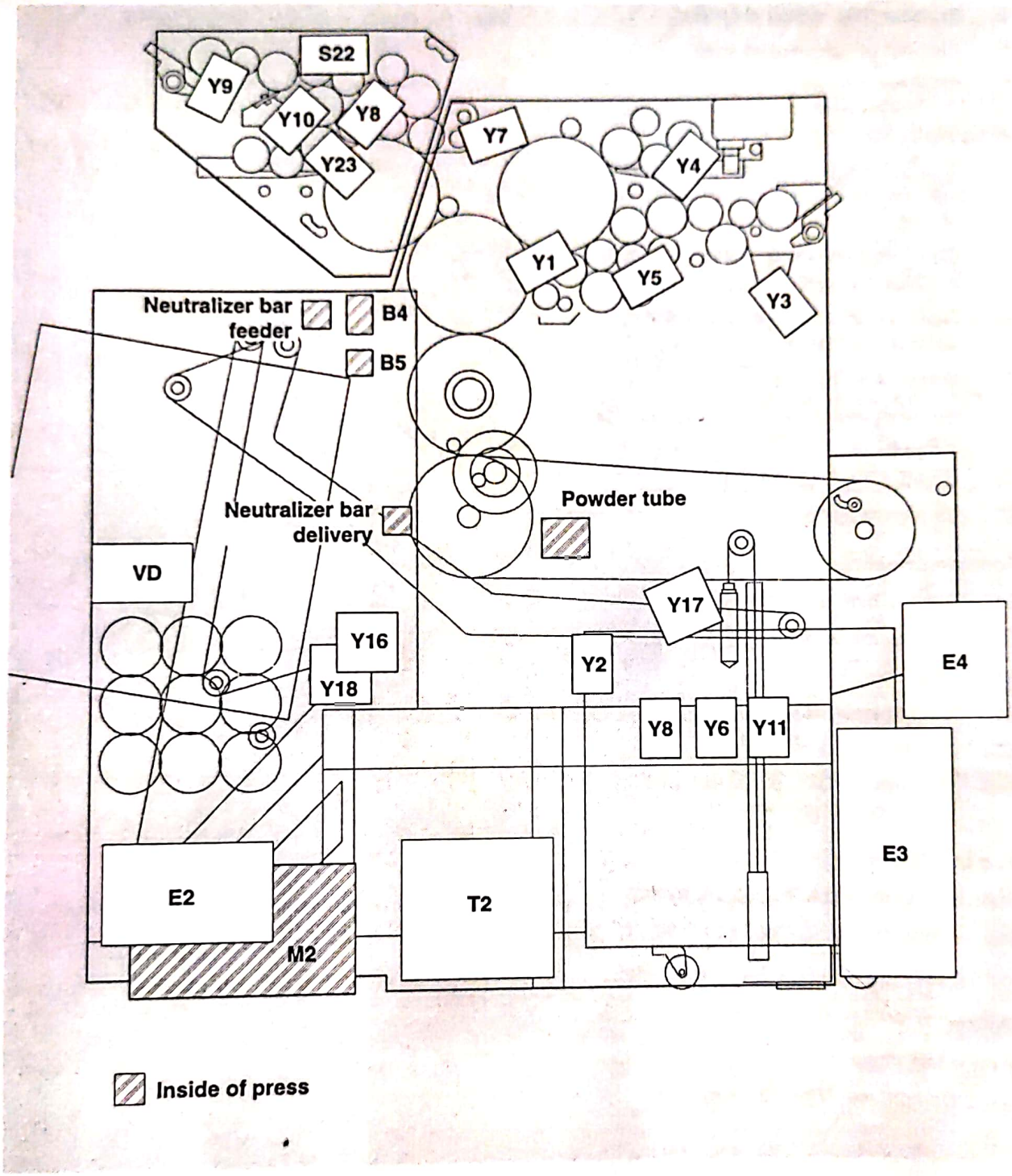
Y14 Ink ductor on/off PU2 (only 2-colour presses)

Y19 Condensate drain valve

Operator control

HTB Main control console

Drive side



Printing press, drive side

Front alignment/double-sheet control

B4 Receiver of double-sheet control and reflex sensor of front alignment control

B5 Transmitter of double-sheet control

VD Front alignment control, double-sheet control

Position switches

S22 Position autoplate PU1 / PU2 (only 2-colour presses)

S23 PU2 thrown on/off (only 2-colour presses)

Electrically actuated mechanisms

Y1 Plate cylinder - blanket cylinder

Y2 Blanket cylinder - impression cylinder

Y3 Inking form rollers on/off

Y4 Dampening form roller on/off

Y5 Blanket washup device on/off

Y6 Opening the front clamping bar

Y7 Opening the rear clamping bar

Y8 Plate cylinder - blanket cylinder PU2 (only 2-colour presses)

Y9 Inking form rollers on/off PU2 (only 2-colour presses)

Y10 Dampening form roller on/off PU2 (only 2-colour presses)

Y11 Opening the front clamping bar PU2 (only 2-colour presses)

Y12 Opening the rear clamping bar PU2 (only 2-colour presses)

Y13 Ink ductor

Y16 Feeder, enabling of suction air

Y17 Delivery, descent release

Y18 Feeder, lift release

Y23 Separating PU2 (only 2-colour presses)

Y24 Unlock toll barrier (only 2-colour presses)

Motors

M2 Pump for suction and blast air

Other equipment

E1 Light at delivery

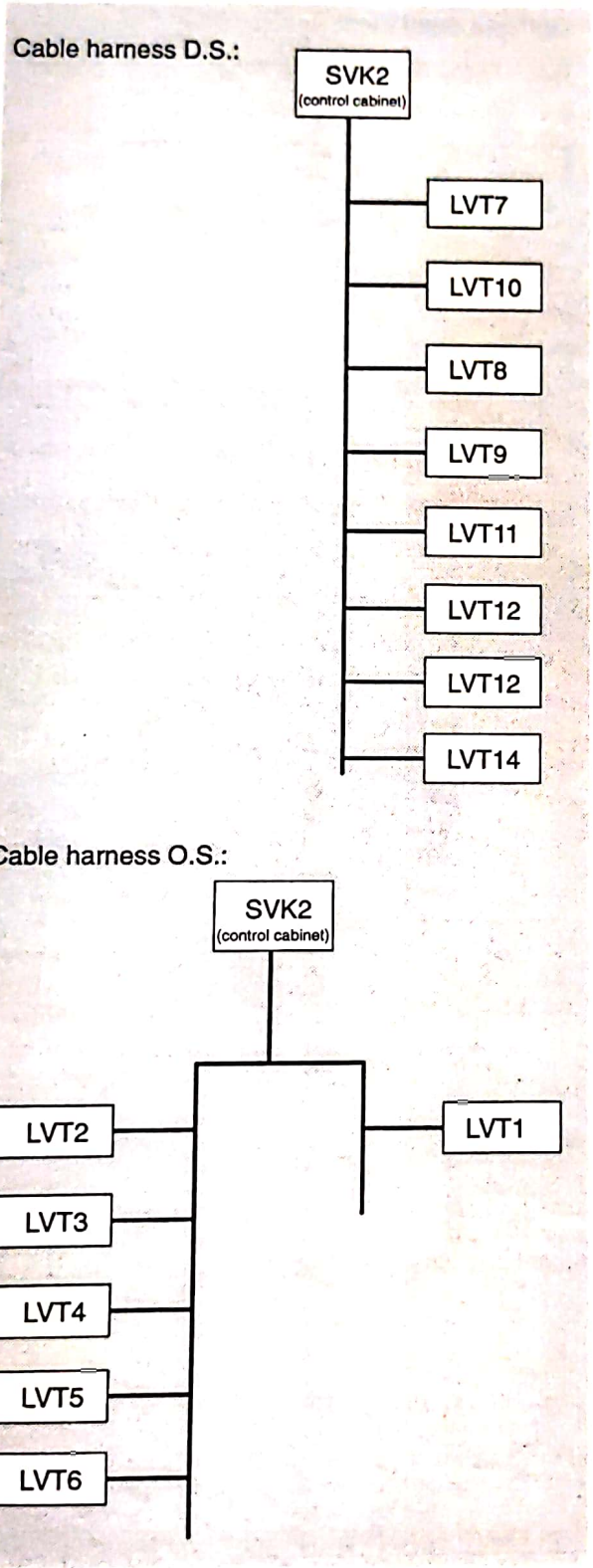
Optional equipment

E2 Static electricity eliminator

E3 Powder spray device

E4 Tape inserter

Distribution boxes

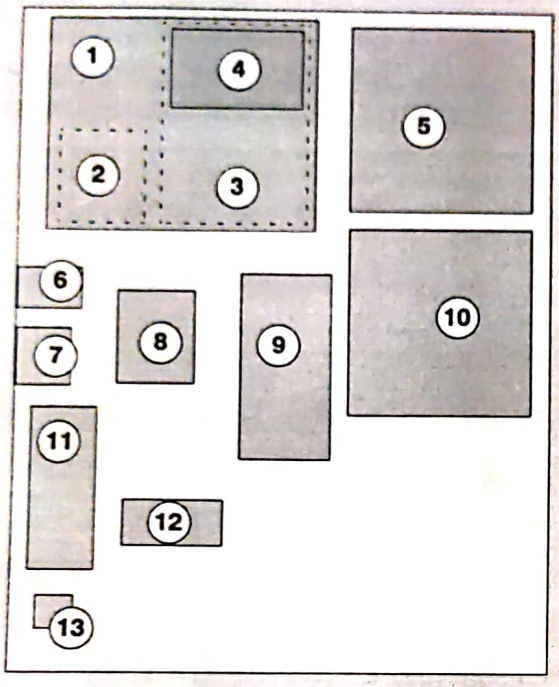


Cable harness D.S. and O.S.

The distribution boxes LVT1 ... LVT12 and LVT14 are screwless plug-in terminals which are located directly at the cable harness. They are tagged. For the connected components please refer to the circuit diagram.

Distribution boxes	Function	Press side
LVT1	24V DC	O.S.
LVT2	24V DC	O.S.
LVT3	Ground 24V	O.S.
LVT4	24V DC	O.S.
LVT5	24V DC	O.S.
LVT6	24V DC	O.S.
LVT7	24V DC	D.S.
LVT8	24V DC	D.S.
LVT9	24V DC	D.S.
LVT10	Ground 24V	D.S.
LVT11	24V DC	D.S.
LVT12	24V DC	D.S.
LVT13	Pneumatic system	O.S.
LVT14	24V DC	D.S.

Control cabinet



①	TRM2	Transistor control module 2
②	NEK	Mains electronic board (component of TRM2)
③	TRK	Transistor control board (component of TRM2)
④	MRK	Motor control board
⑤	ZTK	Central control board
⑥	P1	Totalizer
⑦	HS	Main switch
⑧	T1	Mains transformer
⑨	HVK	Main voltage distributor board
⑩	SVK2	Control voltage distributor board 2
⑪	Z1	Interference suppressor filter
⑫	X1	Terminal strip, connection to power supply
⑬	SKM	Sorter connection module

Design: control cabinet

Index

P

S

T