

1 Preface

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1.1 Contents

This document contains specifications of the layout, data and technical features of printing presses and the related peripheral equipment.

1.2 Utilization

The contents of this document are intended for

- persons who deal with purchasing a printing press;
- persons who deal with planning a printing press site.

1.3 Relevance

These specifications correspond to the series version of the press equipment at the time of the publication of this document.

We reserve the right of making modifications that serve the technical progress.

In case of doubts, please ask your Heidelberg branch office or factory agency for confirmation.

1.4 Produced by

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Table of Contents

A	Installation instructions	A.1
	Important notes for the user	A.1.1
1	Basics about "Technical information"	A.1.3
2	Safety instructions for handling the press	A.1.7
3	Information on warranty and liability	A.1.16
	Preparation of the location of the printing press	A.2.1
1	Notes on the preparation of the press location	A.2.3
	Specifications of data networks	A.3.1
1	Suitable network versions	A.3.3
2	Suitable network servers and their configurations	A.3.14
3	CP2000 ManagementGate	A.3.16
	Electrical installation of the printing press	A.4.1
1	General information on the electrical installation	A.4.3
2	Important information on the mains connection	A.4.5
3	Connection to the power supply network	A.4.13
	Installation of the peripheral devices	A.5.1
1	Installation of Prinect peripheral equipment	A.5.3
2	Installation of supply units	A.5.8
	Electronic interfaces	A.6.1
1	Interface adapter STA	A.6.3
2	Interface input module SEM	A.6.9
3	Interface output module SAM	A.6.13
4	Single-Fault Fail-Safe Extension Module EEM	A.6.19
5	Press cycle position switch 1S65	A.6.21
	Appendix	A.7.1
1	Physical Dimensions, Their Units and Conversion	A.7.3
2	Particular Conversions and Multiples	A.7.4
3	Water Hardness	A.7.5
4	Conversion of Fractions into Decimals	A.7.6
B	Index	B.1

A Installation instructions

Important notes for the user

1	Basics about "Technical information"	A.1.3
1.1	Structure of the safety instructions	A.1.3
1.2	Instigating construction and installation work	A.1.5
1.3	Definition of qualified personnel	A.1.6
2	Safety instructions for handling the press	A.1.7
2.1	Warning	A.1.7
2.2	Delivery and installation of the press	A.1.7
2.3	Operation of the press	A.1.9
2.4	Dismantling the press	A.1.15
3	Information on warranty and liability	A.1.16
3.1	Correct use	A.1.16
3.2	Warranty and liability	A.1.17
3.3	What to do, if...?	A.1.17

1 Basics about "Technical information"

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1.1 Structure of the safety instructions

The "Technical information SM 52" contains three categories of notes. To ensure a better illustration of the individual notes, each category has pictographs assigned which have a fixed meaning that will be indicated below.

1.1.1 Primary safety instructions

Meaning:

These safety instructions warn of possible dangerous situations. The non-observance of these instructions will lead to serious injuries of the personnel and to serious damages of the press and of equipment. In extreme cases, there is danger to life!

Relevant pictographs with signal words:



Warning – <General hazards>



Warning – <Electric current>



Warning – <Rotating rollers, cylinders or gearwheels>



Warning – <Revolving chains>



Warning – <Hot surfaces>

Example:



Warning – Danger due to the installation of outside devices!

Unauthorised installation of third-party equipment endangers personnel and press and may lead to serious damages to health of the personnel or to serious damages to the equipment. Heidelberg Druckmaschinen AG therefore does not accept any warranty or liability for injuries of the personnel or for damages to the press, or for defects caused by the installation of third-party equipment.

1.1.2 Secondary safety instructions

Meaning:

These instructions warn of potentially dangerous situations. In case of non-observance, damages to the press and to the additional equipment may be the result.

Related pictograph with signal word:



Caution – <short description of the hazard>

Example:



Caution – Damage and malfunction on electrical devices due to electromagnetic interference!

Prior to using third-party equipment together with the printing press you must ensure that there is no electromagnetic interference in the electronics of the printing press or in the third-party equipment.

1.1.3 Third-degree note

Meaning:

This message gives you additional information and provides tips for operating printing presses as well as additional equipment.

Relevant pictograph with signal word:

▶ **Note**

Example:

▶ **Note**

A series transformer is supplied together with the printing press.

1.2 Instigating construction and installation work



Warning – Danger due to inexpertly effected construction and installation work!

The following instructions must be observed:

Arrangement

All required planning and preparation measures as well as any construction and installation work regarding the preparation of the location of the press and its installation, must be arranged by the print shop management.

Planning and preparation

The qualified, skilled personnel assigned by the user is in charge of the planning and preparation measures regarding the preparation of the location of the press and its installation. The user has to ensure that the skilled personnel is trained and qualified correspondingly and able to carry out successfully the required planning and preparation measures according to the current laws and regulations.

Implementation

The necessary work has to be effected expertly and according to the current standards and regulations. The qualified, skilled personnel assigned by the user will be in charge of the implementation.

1.3 Definition of qualified personnel

Skilled and qualified personnel refers to personnel with the following characteristics:

- A complete official training or apprenticeship regarding the respective special field according to the current laws, regulations and standards.
- Knowledge and experience gained by activities concerning the respective special field.
- Special knowledge regarding the respective current laws, regulations and standards as well as regarding the rules of technology, safety, accident prevention, personal and environmental protection regulations.
- The ability to carry out the required work safely and successfully.
- The ability to recognise the risks and dangers arising due to the work and to neutralise them by the corresponding measures.

As circumstances dictate, it is possible to judge the qualification and aptitude of a person by several years of experience in the special field concerned. In connection with such judgements, the current national rules, regulations, and guidelines must always be observed.

2 Safety instructions for handling the press

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2.1 Warning

**Warning – Danger to personnel and press due to the non-observance of the following safety instructions!**

The user and all persons in charge of planning, preparation or implementation will have to take note of the following section. The user of the press has to ensure that these safety instructions as well as the safety instructions of all further documents are read and understood by all persons involved. Handling the press is only allowed when considering all current regulations and safety instructions.

2.2 Delivery and installation of the press

**Warning – Danger to personnel and press due to the non-observance of the relevant safety instructions!**

The following information will have to be considered:

2.2.1 Unloading and transport

Unloading procedures from the delivery vehicle and subsequent transports within the print shop must always be supervised by a Heidelberg Service engineer.

The user has to provide appropriate lifting devices and industrial trucks of sufficient loading capacity to unload and transport the press. The loading capacity of the vehicles must correspond to the specifications of weight and dimensions of the packaging units that are specified in the document "Technical specifications SM 52".

The press components must be transported in a vertical position. To avoid damages, do not tilt pallets, crates or other shipping containers.

To ensure a smooth installation of the press, the press components should not be stored on the future installation location.

► Note

For your orientation when you unload and put the press components in place, the labels on the shipping crates (over-seas packaging) are always at the operator's side (O.S.).

2.2.2 Intermediate storage

In case of an intermediate storage of the shipping units or press components, the following aspects will have to be taken into account:

- The press components must be stored in a dry place and not be exposed to atmospheric influences.
- The roller coatings must be protected against UV and thermal radiation.
- The storage temperature has to be kept, in case of a relative humidity of less than 90 %, in the range of minimum -20 °C (-4 °F) to maximum $+50\text{ °C}$ (122 °F).

2.2.3 Installation and modifications

The individual structural components of the press are covered by a protective foil. This protective foil should only be opened and removed at the future location of the press when press temperature and room temperature are balanced. The temperature will have assimilated not earlier than 12 hours after bringing the subassemblies into the pressroom.

During the installation of the press and its equipment, the current safety regulations must be observed. The accessibility of the intended escape routes and rescue facilities must be ensured.

Any work required for installing the press and the supply facilities (power, water and compressed air connections, etc.) may only be carried out by qualified and skilled personnel. The requirements to be met by qualified and skilled personnel are indicated in the section "Definition of qualified and skilled personnel".

The equipment supplied with the press may only be used for the purposes it is intended for.

Water and air hoses and all electrical cables must be installed in such a way that they do not obstruct and are protected from damage. If possible, these supply lines should be guided via cable and hose links.

2.2.4 Attachment or installation of outside devices

**Warning – Danger due to the installation of third-party equipment!**

Unauthorised attachment or installation of third-party equipment or unauthorised structural modifications of the press and of its accessory devices as well as modifications regarding control and software will disturb the operational reliability and may lead to serious injuries of persons or to serious damages of the press.

Heidelberger Druckmaschinen AG therefore does not accept any warranty or liability for injuries of the personnel, damages of the press, or defects caused by unauthorised manipulations of press components or units as well as of the software and of the control.

2.3 Operation of the press

**Warning – Danger to personnel and press due to the non-observance of the safety instructions!**

When operating the press, the relevant safety instructions and accident prevention regulations as well as the safety instructions of the provided documentation must be observed. Any work to be effected at or by means of the press must be carried out by taking into account the corresponding protective measures.

The user or the print shop management has to ensure the corresponding operative conditions due to the responsibility of all working areas within the print shop.

2.3.1 General safety instructions

Safety devices

It is not allowed to remove, to manipulate or to bypass the safety devices of the press. Check the correct function of the safety devices daily.

Documentation

The following documents must be permanently available near the press for all authorized persons:

- The operating manual of the press.
- Maintenance manual of the printing press.
- Operating manuals of additional devices which are directly and functionally related to the press.
- The safety data sheets of all chemicals used for the press.

The user has to ensure that every authorised person in charge of the operation of the press and of its additional devices has read and understood the operating manuals. All safety notes and instructions must be observed.

Operators

The press may only be operated by trained and qualified staff who have received special training at the press and at all its additional devices. The requirements regarding qualified and skilled personnel are indicated in the section "Definition of qualified and skilled personnel".

Training of personnel

The operators of the press must attend intra-company training at regular intervals regarding the following subjects:

- Safe work at the printing press.
- Safe handling of chemicals (inks, varnish, cleaning solutions, etc.).
- Environmentally compatible disposal of residual materials and production residues.

Personal protection equipment

The personal protection equipment must be made available and used, the following protective measures must be taken:

- When working with the press:

Wear close-fitting work clothes and safety shoes.

Wear a hairnet, if necessary.

Remove rings, necklaces, watches and other pieces of jewellery that might be caught by grippers or by other moving parts of the press.

- When handling chemicals;
Wear protective gloves and glasses, appropriate protective clothing, if necessary.

General protective measures

The following measures must be taken within the area of the press to prevent dangers:

- Ensure sufficient room ventilation.
- Ensure sufficient accessibility of rescue facilities like main safety switch, fire extinguisher, telephone.
- Escape routes must be marked and kept free from obstacles.

Safety instructions regarding the handling of chemicals

When using combustible or explosive substances, the related current safety instructions must be observed. In general, consider that

- open fire or open ignition sources in the pressroom are not allowed, smoking is absolutely not allowed.
- Any grinding, soldering or welding work in the pressroom is only allowed considering the relevant safety instructions.
- Chemicals may only be stored in adequate and marked containers. When using these substances, do not eat, drink or smoke. Outflowing or escaping chemicals must be removed immediately.
- Use chemicals with a flash point above the following temperatures only:
 - Printing ink:
> 100 °C (> 212 °F)
 - Varnish:
> 55 °C (> 131 °F)
 - Cleaning solutions:
> 55 °C (> 131 °F)

The use of chemicals of the hazard classes A1 and A2 is not allowed.

2.3.2 Before start of operation

Verify regularly before start of operation, that:

- the Prinect peripheral equipment can be started without fault;
- the cooling system has been activated and the hose connections are in a proper condition;
- all mechanical and electrical safety and protective devices are firmly installed, functioning, and in a correct condition. These devices are, among others, guard covers and protecting devices as well as emergency-stop buttons on the printing press.
- no foreign bodies are in the printing press or can get into the device during operation.

Only if all the above mentioned requirements are fulfilled, and if there are no dangers or defects obvious to the operator, the press may be put into operation.

2.3.3 During the operation

The following safety instructions must be observed during the operation of the press:

Container with combustible substances

Do not put down or store containers with volatile or combustible substances or with cleaning solutions on or near the press.

Control cabinets and casings

Keep control cabinets and casings always closed during the operation of the press.

Protection grids

It is not allowed to operate the press when the protection grids of the blowers or of the rack openings are removed or uncovered.

Protective devices

The operation of the press is only allowed when the protective devices are closed. For installation and cleaning purposes, determined operation modes are possible in case of partially opened protective devices. In order to prevent injuries or damages, the operator has to ensure, before starting up the press, that no objects can fall into the press and that no persons are situated within the area of moving parts.

Supervision

The press must be supervised during the operation by authorised service staff. Keep unauthorised persons out of the area of the press.

Waste and residual matters

Produced waste and residual matters (e.g. residual inks, contaminated dampening solutions, etc.) must be disposed of according to the current environmental regulations.

2.3.4 Malfunction or failure of safety devices**Warning – Danger to personnel and press due to a malfunction or failure of the safety devices!**

In case of a malfunction or failure of the safety devices, the following measures must be taken:

- Switch off the press immediately, render it safe against re-activation (lock main switch with a padlock).
- Depressurise pressurised devices.
- Notify the Heidelberg service.

2.3.5 Stop or interruption of operation

Concerning the stop or interruption of operations, the following will have to be taken into account:

- Wash the inking unit, the blanket and of the impression cylinder.
- Switch off the Speedmaster with the main switch on the control cabinet.
- Deflate the compressed air out of the pneumatic system.



Note

Once the press has been shut down, the blowers of the machine sets keep running for another minute approximately.

2.3.6 Maintenance work and repair



Danger – Electric shock due to the touching of live parts!

The central control box (ZSG) will not become potential-free by deactivating it via the main switch.

In order to de-energise the central control box, the mains connection must be disconnected from the power supply network. This work may only be initiated by the user or by the print shop management and may only be carried out by qualified and skilled personnel (see also section "Definition of qualified and skilled personnel").

Instructions regarding maintenance and repair

Unless expressly mentioned differently, maintenance and repair work may only be effected by the authorized Heidelberg Service.

Use original Heidelberg spare parts only, to replace defect components and elements of the press or for the replacement of wear parts like suction tapes, CPC-ink fountain foils, etc.

When replacing consumable items such as filter cartridges and washup solutions, quality parts or quality materials according to the Heidelberg Specifications should be used only.

Check the proper function of all safety devices after maintenance and repair procedures.

Rollers that may be removed by the operator must be rested on their bearing journals and stored on suitable racks.

**Note**

Additional safety information that must be observed can be found in the appropriate places in the documents that come with the printing press.

2.4 Dismantling the press

**Warning – Danger due to the non-observance of the safety instructions!**

The dismantling of the press may only be effected by qualified and skilled personnel according to the current laws, regulations and safety regulations. The disposal of residual matters, components and devices has to be carried out according to the current environmental and waste disposal regulations.

Instructions regarding the dismantling

Disconnect all supply lines (electricity, water, air) before starting the dismantling procedure. Depressurise pressurised devices and units.

All working materials and components belonging to them must be removed from the press and from its peripheral devices and must be disposed of environmentally safe in suitable containers. For example, these materials and components are:

- Working materials:
Oil, grease, ink, dampening solution, washup solution and other substances and their residual matters.
- Components:
Containers for residual matters such as contaminated washup solution and filters or filter cartridges, etc.

3 Information on warranty and liability

3.1 Correct use

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**Warning – Danger due to an incorrect use of the printing press!**

The following information will have to be considered:

The Speedmaster SM 52 is a sheet offset printing press that is suitable for printing on and, if necessary, coating of tabular flexible printing material of the following properties:

- Maximum thickness of printing material:
0.4 mm (0.016 in)
- Maximum sheet size:
360 x 520 mm (14.17 x 20.47 in)

The press may only be operated by specially trained and qualified skilled personnel (see section "Definition of the qualified skilled personnel") according to its proper use and in accordance with the national safety and accident prevention regulations and according to the documentation provided with the press.

The correct use and operation of the press may only be effected from the following working places:

- CP2000 Center or CPC 1-04 control console with CPTronic central control console;
- Control consoles and control panels on the printing press;
- Foot steps and foot boards on the press
- Operative area at the feeder for printing material supply
- Operative area on the delivery for removing the printing material.

Only the operations of the press and its peripheral devices that are described in the current documentation will represent the correct use of the press.

3.2 Warranty and liability



Warning – Exclusion of liability or warranty!

In general, warranty and liability claims are excluded, if injuries to persons or damages to equipment are caused by the following:

- Outside influences;
- Act of God;
- Neglected maintenance.

A possible claim for warranty and liability requires conformity to the following aspects:

- Relevant national regulations such as safety, accident prevention and environmental regulations must absolutely be observed.
- Installation, maintenance, modifications, and dismantling of the press are only to be carried out by authorised Heidelberg Service Technicians.
- The press may only be put into operation after the verifications according to the "Safety instructions".
- The press may only be operated according to the section "Correct use".

3.3 What to do, if...?

In case of malfunctions or if problems regarding the press components, peripheral devices, control system or software and in particular regarding the safety devices occur, the following measures must be taken:

- Stop the press immediately and render it safe against re-activation.
- Contact the Heidelberg Service to clarify the technical details.

The Heidelberg Service is organised as a worldwide service network and can be contacted regarding any questions via the next Heidelberg branch or agency. The Service is focused on the following aspects:

- International hotline to clarify technical details and problems as well as online diagnosis of malfunctions.
- Worldwide repair and maintenance service as well as complete supply of spare parts.

- Development of special applications and documentation according to the requirements of the customer.
- Training of personnel.

**Note**

Please contact the "Print shop planning" department of Heidelberger Druckmaschinen AG via Heidelberg Service if you have any further queries about planning and preparing the press location and/or the infrastructure of a print shop.

Preparation of the location of the printing press

1	Notes on the preparation of the press location	A.2.3
1.1	Warning	A.2.3
1.2	Check list for preparing the press installation	A.2.3
1.3	Structural conditions	A.2.4
1.4	Supply mains and networks	A.2.8
1.5	The Print shop planning department of Heidelberger Druckmaschinen AG	A.2.11

1 Notes on the preparation of the press location

1.1 Warning

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Warning – Danger due to inexpertly effected construction and installation work!

All planning activities and necessary work for the preparation of the location of the press must be arranged by the user or by the print shop management. The necessary planning and work must be effected, in accordance with the relevant national regulations, by skilled personnel.

1.2 Check list for preparing the press installation

After the conclusion of the purchase contract, the preliminary planning of the installation work will start by means of the "Check list for preparing the press installation" submitted by the sales consultant of the responsible branch or agency.

The sales consultant discusses the situation with the customer on site and assists the customer regarding the determination of the required measures concerning delivery, unloading, installation and initial operation of the press.

The user or the management of the print shop will be responsible of the implementation of required construction and infrastructural measures for the expert preparation of the location of the press.

Please contact the "Print shop planning" department of Heidelberger Druckmaschinen AG if you have any further queries.

1.3 Structural conditions

The subsequent instructions and reference values determine the possibly necessary measures for the structural preparation of the location of the press.

1.3.1 Floor space and room heights required

When planning the installation of the press, the following aspects, among others, should be taken into account:

- accessibility of the press components;
- favourable material handling;
- space required for repair and maintenance work.

The required information can be found in the floor plans and the corresponding sections of the "Technical specifications SM 52".

Regarding the room climate, a large room volume is recommended. The reference value for the clear room height (excluding lowered ceilings and double floors) is:

Reference value: clear room height	
[mm]	[in]
4000 to 5500	157.5 – 216.5

Tab. 1 Reference value of room height

1.3.2 Ceilings, floors and flooring materials

Loading capacity of ceilings and floors

Concerning safety and flexibility when selecting the production means, stability and a high loading capacity of ceilings and floors are favourable.

A verification of the loading capacity of the planned location through an architect or structural engineer is recommended.

Reference value: loading capacity of ceilings and floors	
[kg/m ²]	[lbs/sq ft]
3000	615

Tab. 2 Reference value, loading capacity of ceilings and floors

Flooring materials

When selecting the flooring materials, apart from safety and environmental regulations, the following criteria must be taken into consideration:

- stability and abrasion behaviour;
- resistant to oil and chemicals;
- non-slip and antistatic characteristics.

A detailed discussion with experts should be effected in good time, also regarding costs, durability, care and maintenance.



Note

During the transport of piles on pallets, there can be compressive loads per unit area of up to 450 N/cm² (653 lbf/sq in) at the fork lift wheel.

1.3.3 Foundations

If and how foundations have to be constructed depends on the structural conditions of the intended location of the press. A verification of the existing structural conditions through an architect or through a structural engineer is recommended.

Information about press foundations can be found in the "Technical specifications SM 52".

1.3.4 Arrangement of the supply networks

On account of flexibility, clarity and accessibility of supply mains (electricity, water, air, etc.) an installation from above (overhead installation) via cable ducts and hose ramps has proved efficient in practice.

1.3.5 Wall and door openings

For the press transport into the print shop building, appropriate wall or door openings as well as transport ways in or around the print shop building are required.

Whether or not existing openings and ways are sufficiently dimensioned for the transport depends on the goods to be transported and on the devices used for the transport (fork-lift trucks, industrial trucks, etc.). In particular, the height of the loaded transport device has to be considered. The reference values are the following:

Reference value: building/door opening		
	[mm]	[in]
Width:	3000	118.1
Height:	2800	110.2

Tab. 3 Building/door opening

The dimensions of press components and packaging components can be found in the "Technical specifications SM 52".

1.3.6 Escape and rescue facilities

When planning the location of the press, appropriate escape and rescue facilities must be taken into consideration according to the relevant accident prevention regulations.

Escape routes must be planned and marked in such a way that they lead via the shortest route possible into the open, to a safe area or that they enable a fast rescue from outside.

Rescue devices (safety main switch, fire extinguisher, emergency phone, etc.) should be installed near the press.

1.3.7 Ventilation and air conditioning

The room climate at the location of the press should be adapted, considering the local conditions and relevant regulations, to the demands of the print shop.

Depending on the press, different amounts of heat are produced when operating the press, an appropriate ventilation has to be effected for the stability of the room climate. The heat produced should be carried off and re-used adequately by the installation of an air circulation device with heat exchanger or by an air conditioning unit.

Reference values for the air at the location of the press:

Air reference values		
General dust limit value:		
Max. content of particles	6 mg/m ³	0.003 gr/cu ft
Max. size of particles	10 µm	0.3937 mil
Air temperature:		
Ideal	18 – 21 °C	64 – 70 °F
Maximum	40 °C	104 °F
Air humidity:		
Relative humidity	50% – 58%	
Air velocity:		
Maximum	0.2 m/s	0.65 fps

Tab. 4 Air reference values

1.3.8 Lighting

For a sufficient lighting at the location of the press and in particular at the matching area for the printed sheet control, the following reference values have to be taken into account:

Reference values for lighting		
Printing press:		
Illuminance	600 – 700 lx	56 – 65 fc
Colour temperature	4200 K	
Colour matching area (printed sheet control):		
Illuminance	1200 – 1500 lx	112 – 139 fc
Colour temperature	5000 – 6500 K	

Tab. 5 Reference values for lighting

- ▶ **Note**
To provide for aging and soiling of the lighting system, the illuminance of the installed lighting should be approximately 25% stronger than the calculated illuminance.

1.3.9 Vibration and noise silencing

When suitable materials and designs of walls, ceilings, floors, foundations and flooring materials are selected, vibrations and noises caused by the press can be excluded in general.

Thus, special silencing measures are not usually necessary.

Any questions that may arise in this context can be clarified by the Heidelberg Service.

1.4 Supply mains and networks

The subsequent instructions and reference values determine the possibly necessary measures for preparing the location of the press by infrastructural measures.

Usually, the power supply of the presses of the SM 52 series merely requires the electrical connections described in the sections "Electrical installation of the printing press" and "Electrical installation of Prinect peripheral equipment". For filling the dampening solution devices and, if necessary, the temperature control devices of the inking units as well as cooling devices (water cooling of the sheet guidance) a water supply connection at the location of the press is recommended.

The standard SM 52 presses are equipped ex factory with integrated or additional devices for the production of compressed, suction and blast air and, if necessary, with a temperature control of the inking unit. A supply by means of supply units already existing in the print shop of the user is not planned. In case of a connection to a supply unit already existing in the print shop of the user, the technical details should be discussed with the Heidelberg Service.

1.4.1 Electrical power supply and mains connection



Caution – Malfunctions and damages of electrical devices due to an inexpertly dimensioned power supply!

The necessary mains connection must be determined in time by the user in cooperation with the local energy supply company. This will also be the case, if an old press is replaced by a new one. The power ratings of the new press may be different.

The information, data and guidance values that are required for planning can be found in the Section "Electrical installation of the printing press" and in the "Technical specifications SM 52".

- ▶ **Note**
We recommend an overhead routing of the power supply cables via cable racks or cable trays.

1.4.2 Water supply and treatment

To operate dampening solution devices and temperature control devices for the inking unit as well as for other reasons, water is required for the printing press. The water used should be clean, free of soluble and insoluble pollution and chemically neutral to prevent malfunctions of the press.

Whether the locally available water (raw water) may be used without further treatment, depends on the water quality. Regarding the suitability, ensure a possibly low ion concentration of chloride, sulphate and nitrate and a low electric conductance. The local water supply company will surely provide the necessary information.

To assess the water quality of the raw water regarding the corrosion protection and the printing result, the following criteria may be taken into account:

Reference values for raw water		
Water hardness:		
Minimum	8 °dH	5.4 mmol/USgal
Maximum	12 °dH	8.1 mmol/USgal
Electric conductance:		
Maximum	500 µS/cm	
pH-value:		
Range	7 – 8	

Tab. 6 Reference values for raw water

If the available raw water exceeds these reference values, in general, a treatment will become necessary. In this case, a solution in cooperation with the Heidelberg Service must be found.

1.4.3 Supply and treatment of compressed air

The compressed air required for operating the press is produced and treated by means of an integrated compressor device. An external supply has not be taken into account.

When planning the location of the press, ensure a sufficient supply of dry, dust and oil-free fresh air for the compressed air production.

For the supply of the integrated compressor device with ambient air, the following reference values will be the basis for any calculations:

Reference values for the production of compressed air		
Suction capacity during continuous operation:		
SM 52-1 and -2	4.3 m ³ /h	151.85 cu ft/h
From SM 52-4 on	7.5m ³ /h	264.86 cu ft/h
Suction temperature (ambient air):		
Minimum	0 °C	32 °F
Maximum	40 °C	104 °F

Tab. 7 Reference values for the compressed air supply

1.4.4 Supply of suction and blast air

The suction and blast air required by the press is produced and treated by means of an integrated blower device. An external supply has not be taken into account.

When planning the location of the press, ensure a sufficient supply of dry, dust and oil-free fresh air for the production of suction and blast air. The guidance value for the suction air is shown in the table above.

1.5 The Print shop planning department of Heidelberger Druckmaschinen AG

Concerning the planning of modifications or extensions of print shops, Heidelberger Druckmaschinen AG offers a worldwide service.

The Heidelberg Print Shop Planning Dept. offers manifold assistance regarding the following aspects:

- Preliminary design of buildings;
- Function planning;
- Work flow and material handling (logistics);
- Supply facilities (infrastructure of print shop).

Building design such as drafts, building plans, drawings or calculations concerning statics, costs, dimensions, etc. should be effected by the local experts (architects, structural engineers, engineers of the fields required) assigned by the management of the print shop. Heidelberger Druckmaschinen AG is not allowed to carry out these tasks due to legal and practical reasons.

The Heidelberg Print Shop Planning Dept. can either be contacted via the Heidelberg Service or directly by the following address:

- Heidelberger Druckmaschinen AG
Abteilung Druckereiplanung
Kurfürsten-Anlage 52-60
69115 Heidelberg, BR Deutschland
Tel: +49-(0)6221/92-0

Specifications of data networks

1	Suitable network versions	A.3.3
1.1	Hardware requirements	A.3.3
1.2	General information	A.3.4
1.3	Network variant 1	A.3.4
1.4	Network variant 2	A.3.5
1.5	Network variant 3	A.3.7
1.6	Network variant 4	A.3.9
1.7	Network variant 5	A.3.11
1.8	Selecting a suitable network version	A.3.13
2	Suitable network servers and their configurations	A.3.14
2.1	Server PC requirements	A.3.14
3	CP2000 ManagementGate	A.3.16
3.1	General information	A.3.16
3.2	Connecting CP2000 ManagementGate to a host (trade-specific software system)	A.3.17
3.3	Linking CP2000 ManagementGate to DataControl	A.3.18

1 Suitable network versions

1.1 Hardware requirements

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Hardware	Prepress interface -CIP3 (exclusive installation)	Plate Image Reader Online (exclusive installation)	PrepressInterface -CIP3 and Plate Image Reader Online (common installation)
Processor	Pentium processor, min. clock frequency 100 MHz, 333 MHz recommended	Pentium processor, min. clock frequency 100 MHz, 333 MHz recommended	Pentium processor, min. clock frequency 100 MHz, 333 MHz recommended
Main memory	Min. 64 MB RAM, recommended 128 MB RAM	Min. 64 MB RAM	Min. 64 MB RAM, recommended 128 MB RAM
Graphics board	Min. 4 MB memory, resolution min. 1024 x 768 pixels at 32768 colours	VGA graphics module	Min. 4 MB memory, resolution min. 1024 x 768 pixels at 32768 colours
Hard disk	Min. 4 GB for operating system, application and user data	Min. 4 GB for operating system, application and user data	Min. 4 GB for operating system, application and user data
Network board	Ethernet adapter for the connection to the pre-press stage and the printing presses	Ethernet adapter for the connection to the printing presses	Ethernet adapter for the connection to the pre-press stage and the printing presses
Monitor	Monitor with a resolution of at least 1024 x 768 pixels	VGA monitor	Monitor with a resolution of at least 1024 x 768 pixels
Interfaces	One parallel interface for the connection of the external system job memory card drive and the Prepress-Interface dongle	One serial interface (RS232) for the online connection of the plate image reader	One parallel interface for the connection of the external system job memory card drive and the Prepress-Interface dongle and one serial interface (RS232) for the online connection of the plate image reader
Additional equipment	Keyboard, mouse, disk drive (3.5 inch) and CD-ROM drive	Keyboard, mouse, disk drive (3.5 inch) and CD-ROM drive	Keyboard, mouse, disk drive (3.5 inch) and CD-ROM drive

Tab. 1

1.2 General information

The following pages show five possible versions for the integration of Heidelberg presses and peripherals into electronic networks.

A print shop network is only required if the "Preset-Link" or "ManagementGate" software modules are used.

Irrespective of the network variant, the "Online Assistance" function requires an analog or ISDN connection to exist.

1.3 Network variant 1

Concept of the network version 1

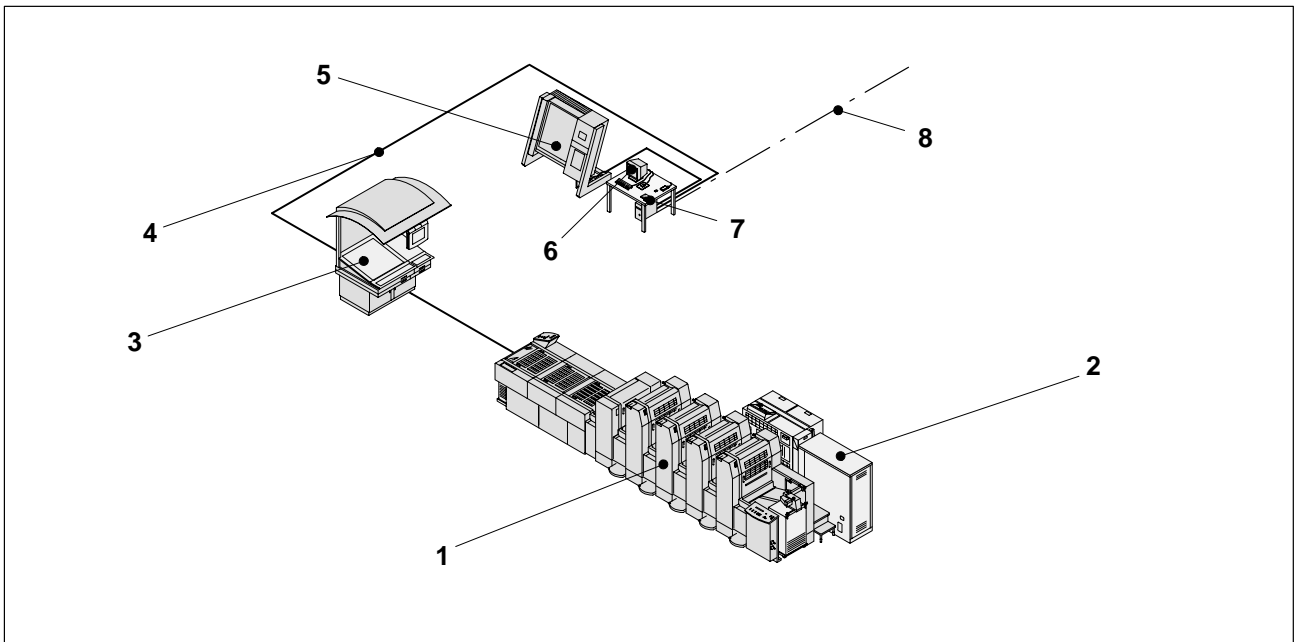
Network connection of one printing press and one Systems peripheral unit. The units employ the NET-BEUI protocol for communicating with each other.

System configuration

A maximum of one printing press and one Systems peripheral unit shall be interconnected in a network. They are positioned in such a way that the network cable is not longer than 100 m (328 ft).

To establish the connection to other networks (to a pre-press network, for example), a second network interface board (NIC) may be installed in the server PC. Any network protocol can be used on this second card.

Installation overview



GF_G550658100000000000

Fig. 1 Network version 1: Interconnecting one printing press and one Prinect peripheral unit (here: plate image reader)

- ① Speedmaster SM 52 printing press
- ② Central control cabinet ZSG
- ③ CP2000 Center with CP2000 software
- ④ Local area network LAN (here: Ethernet)
- ⑤ Plate image reader
- ⑥ PC for the installation of the "Online kit for plate image reader" and/or "PrepressInterface"
- ⑦ Drive for the job memory card (Flash-Memory Card)
- ⑧ Possible connection to another network of the print shop through a second network interface card (NIC)

1.4 Network variant 2

Concept of the network version 2

Network connection of several printing presses and several Systems peripheral units. The units employ the NETBEUI protocol for communicating with each other.

Connection to other networks of the print shop by means of a second network card in the PC for the installation of the "Online kit for plate image reader" or "PrepressInterface".

System configuration

Several printing presses and several peripheral units (Systems equipment, PCs, etc.) shall be interconnected in a network.

The maximum distances between the printing presses and peripherals are such that the total length of the network cables does not exceed 100 m (328 ft).

To establish the connection to other networks (to a pre-press network, for example), a second network interface board (NIC) may be installed in the server PC. Any network protocol can be used on this second card.

Installation overview

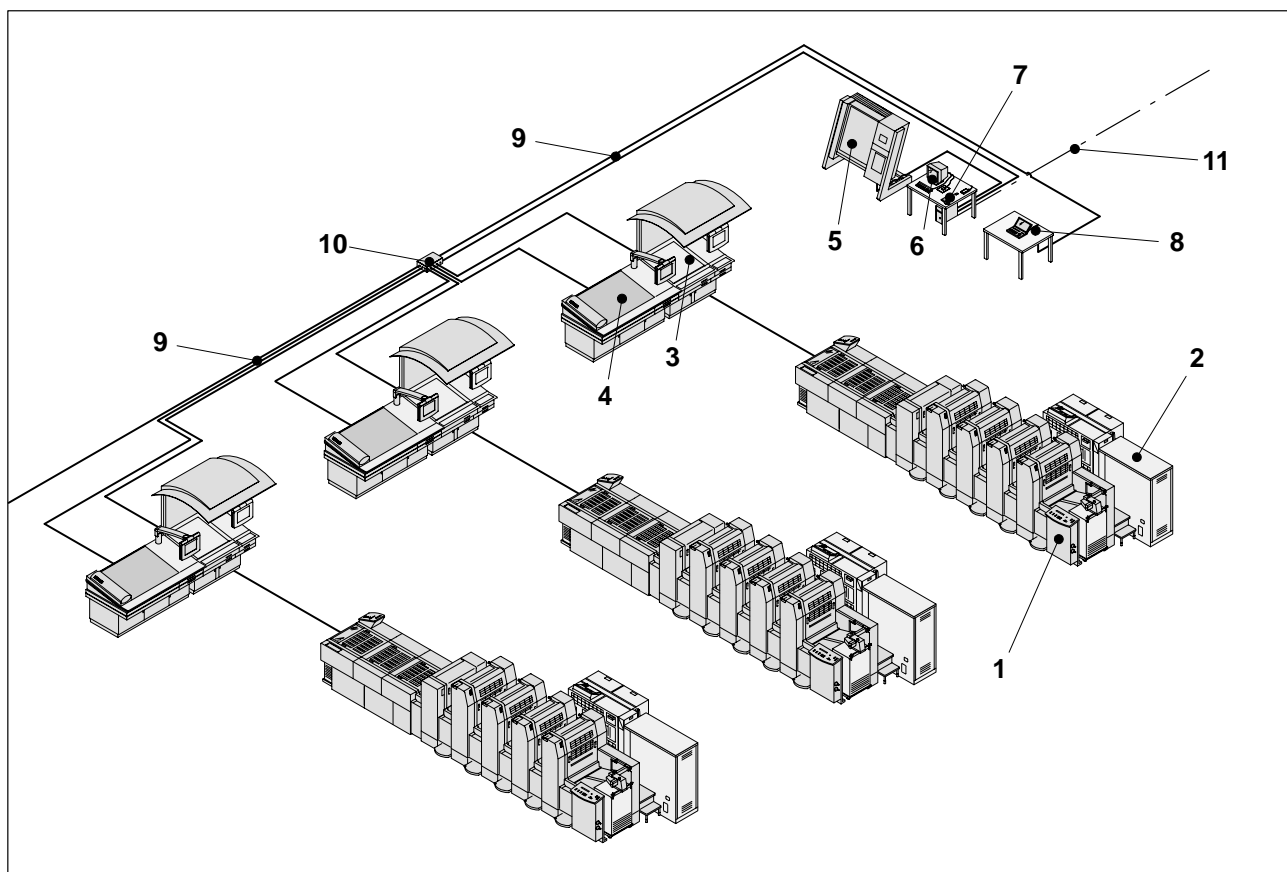


Fig. 2 Network version 2: Network interconnection of several printing presses and several peripheral units

- ① Speedmaster SM 52 printing press
- ② Central control cabinet ZSG
- ③ CP2000 Center with CP2000 software
- ④ ImageControl; this device has a direct data connection to the CP2000 Center and is additionally equipped with its own network board.
- ⑤ Plate image reader

- ⑥ PC for the installation of "Online kit for plate image reader" and "PrepressInterface" as well as their connection to the local network (LAN)
- ⑦ Drive for job memory card (Flash-Memory-Card); drive not provided when press is equipped with DataControl
- ⑧ Network connection, e.g. for connecting a service notebook of Heidelberg Service
- ⑨ Local area network LAN (here: Ethernet)
- ⑩ Hub (is needed when more than two printing presses or peripherals are interconnected)
- ⑪ Possible connection to another network of the print shop through a second network interface card (NIC)

1.5 Network variant 3

Concept of the network version 3

Network connection of several printing presses and several Prinect peripheral units. The units employ the NETBEUI protocol for communicating with each other.

Connection to other networks in the print shop by means of a hub.

System configuration

Several printing presses and several peripheral units (Systems equipment, PCs, etc.) shall be interconnected in a network.

The maximum distances between the printing presses and peripherals are such that the total length of the network cables does not exceed 100 m (328 ft).

For connection to other networks, e.g. a prepress network, only the hub which was used for interconnecting printing presses and peripherals, can be used. It is not permissible to install and use a second network interface board (NIC) in the PC for the installation of the "Online kit for plate image reader" or "PrepressInterface".

Installation overview

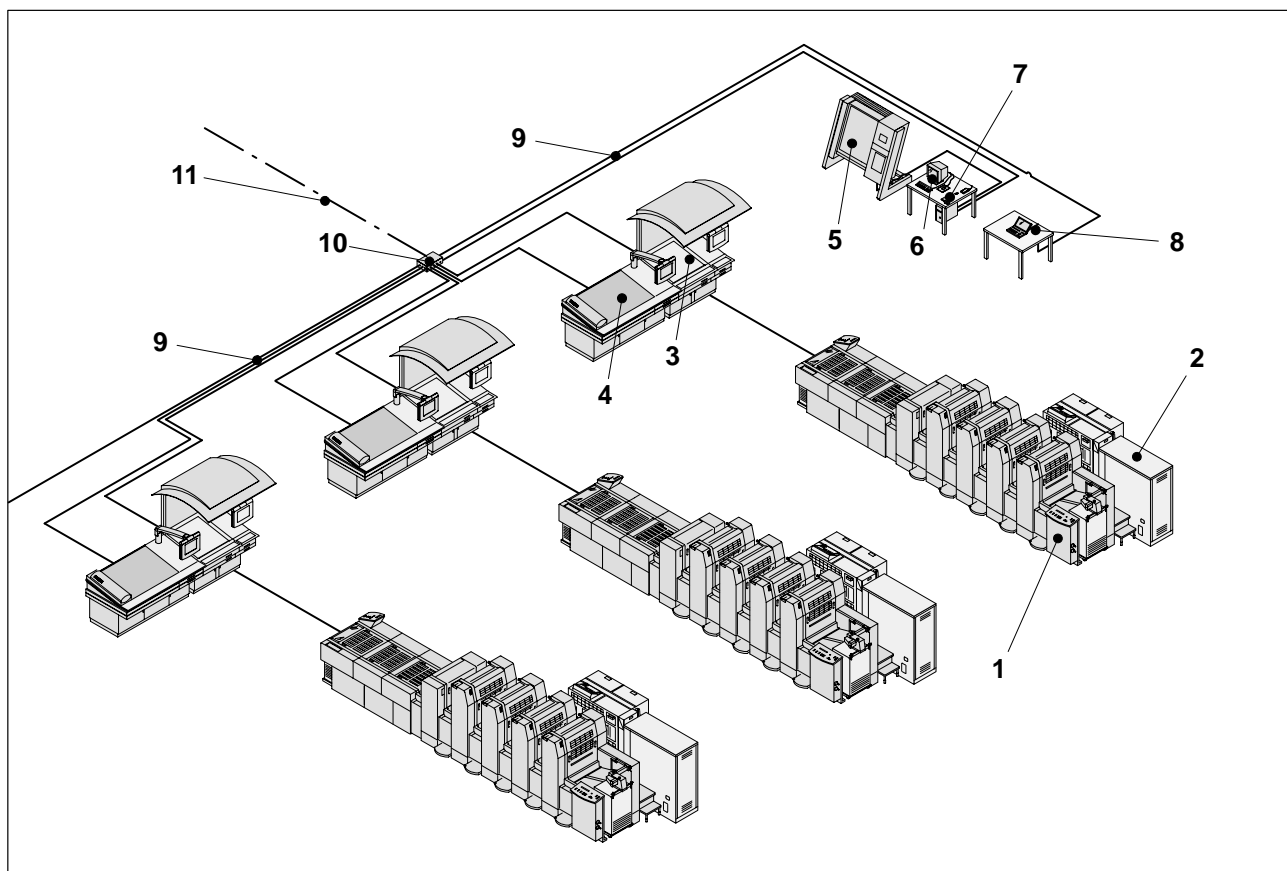


Fig. 3 Network version 3: Networking of several printing presses with several peripherals and additional connection to an existing Prepress network by means of a hub.

- ① Speedmaster SM 52 printing press
- ② Central control cabinet ZSG
- ③ CP2000 Center with CP2000 software
- ④ ImageControl; this device has a direct data connection to CP2000 Center and is additionally equipped with its own network board.
- ⑤ Plate image reader
- ⑥ PC with one network interface board (NIC) for installation of "Online kit for plate image reader" and "PrepressInterface" as well as their connection to the local network (LAN)
- ⑦ Drive for job memory card (Flash-Memory-Card); drive not provided when press is equipped with DataControl
- ⑧ Network connection, e.g. for connecting a service notebook of Heidelberg Service
- ⑨ Local area network LAN (here: Ethernet)
- ⑩ Hub (is needed when more than two printing presses or peripherals are interconnected)
- ⑪ Possible connection to another network of the print shop via the hub

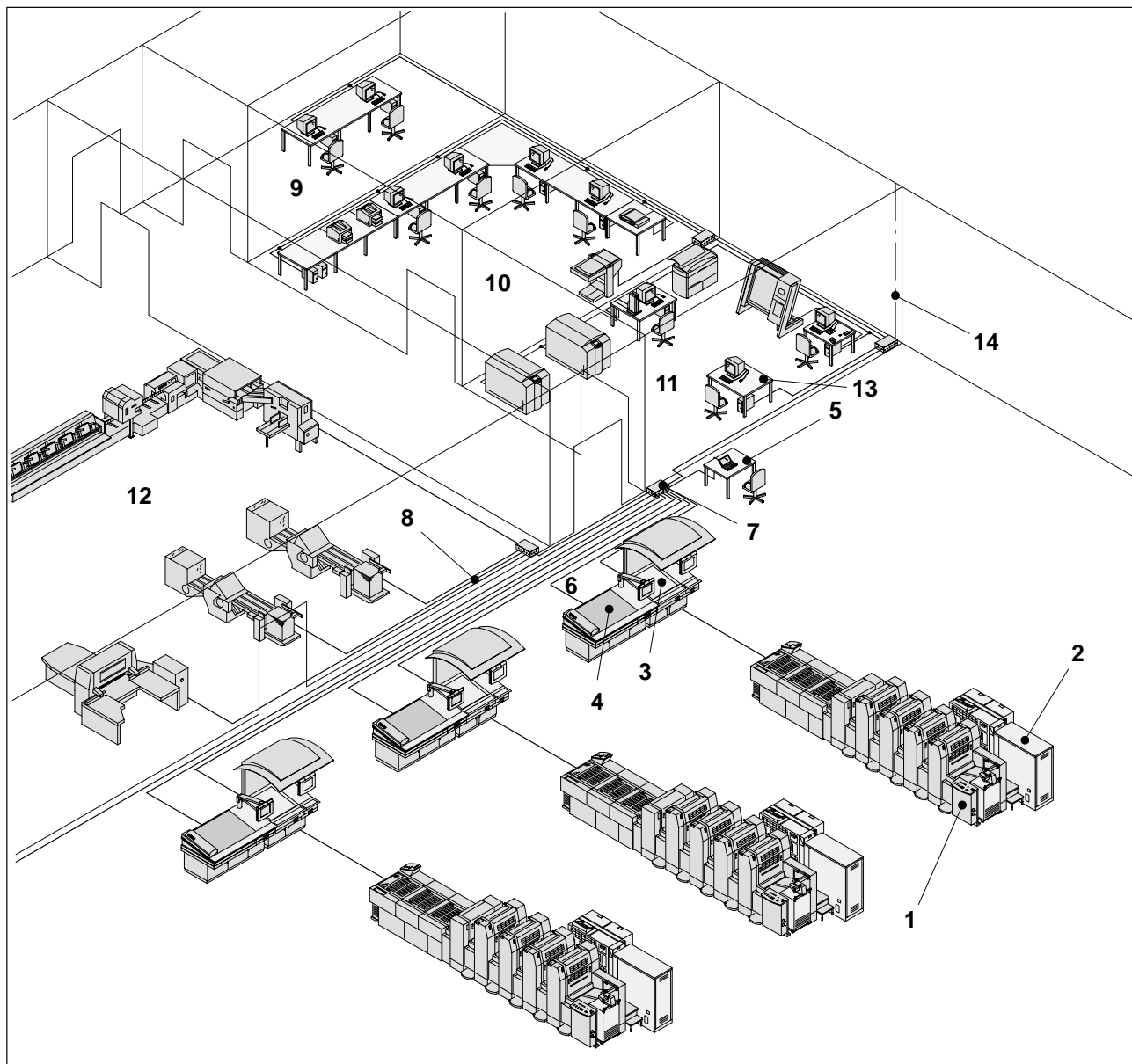
1.6 Network variant 4**Concept of the network version 4**

Integrating several printing presses and several peripheral units into an existing print shop network by means of a hub. The units employ the TCP/IP protocol for communicating with each other. In this version, the Windows NT PC must be set up as a DHCP server. It also fulfills the function of a WINS server if no WINS server is installed in the network.

System configuration

Several printing presses and several peripheral units (Systems devices, PCs, etc.) are to be incorporated in an existing print shop network by means of a hub and a DHCP server.

Installation overview



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Fig. 4 Network version 4: Connecting several printing presses and several peripherals to an existing print shop network by means of a hub

- ① Speedmaster SM 52 printing press
- ② Central control cabinet ZSG
- ③ CP2000 Center with CP2000 software
- ④ ImageControl; this device has a direct data connection to CP2000 Center and is additionally equipped with its own network board.
- ⑤ Network connection, e.g. for connecting a service notebook
- ⑥ Local area network (LAN; here: Ethernet) for Heidelberg presses and peripheral units
- ⑦ Hub

- ⑧ Existing print shop network
- ⑨ Production control area with DataControl and special trade software
- ⑩ DTP area (desktop publishing) with PCs, scanners and printers
- ⑪ Pre-press area with pre-press interface, RIPs (Raster Image Processors), proofing equipment, image setters/developers and CPC31 (plate image reader)
- ⑫ Post-press area with cutting machines, folding machines and gatherer-stitchers
- ⑬ Windows NT PC functioning as DHCP server or, if necessary, as a WINS server too; equipped with one network card
- ⑭ Connection to another local area network (e.g. administration)

1.7 Network variant 5

Concept of the network version 5

Using hub and router for linking several printing presses and several peripherals to an existing print shop network. The units employ the TCP/IP protocol for communicating with each other. In this version, the Windows NT PC must be set up as a DHCP server and WINS server. In addition, it performs router functions.

System configuration

Several printing presses and several peripheral units (Systems equipment, PCs, etc.) are to be linked to an existing print shop network by means of a router.

Installation overview

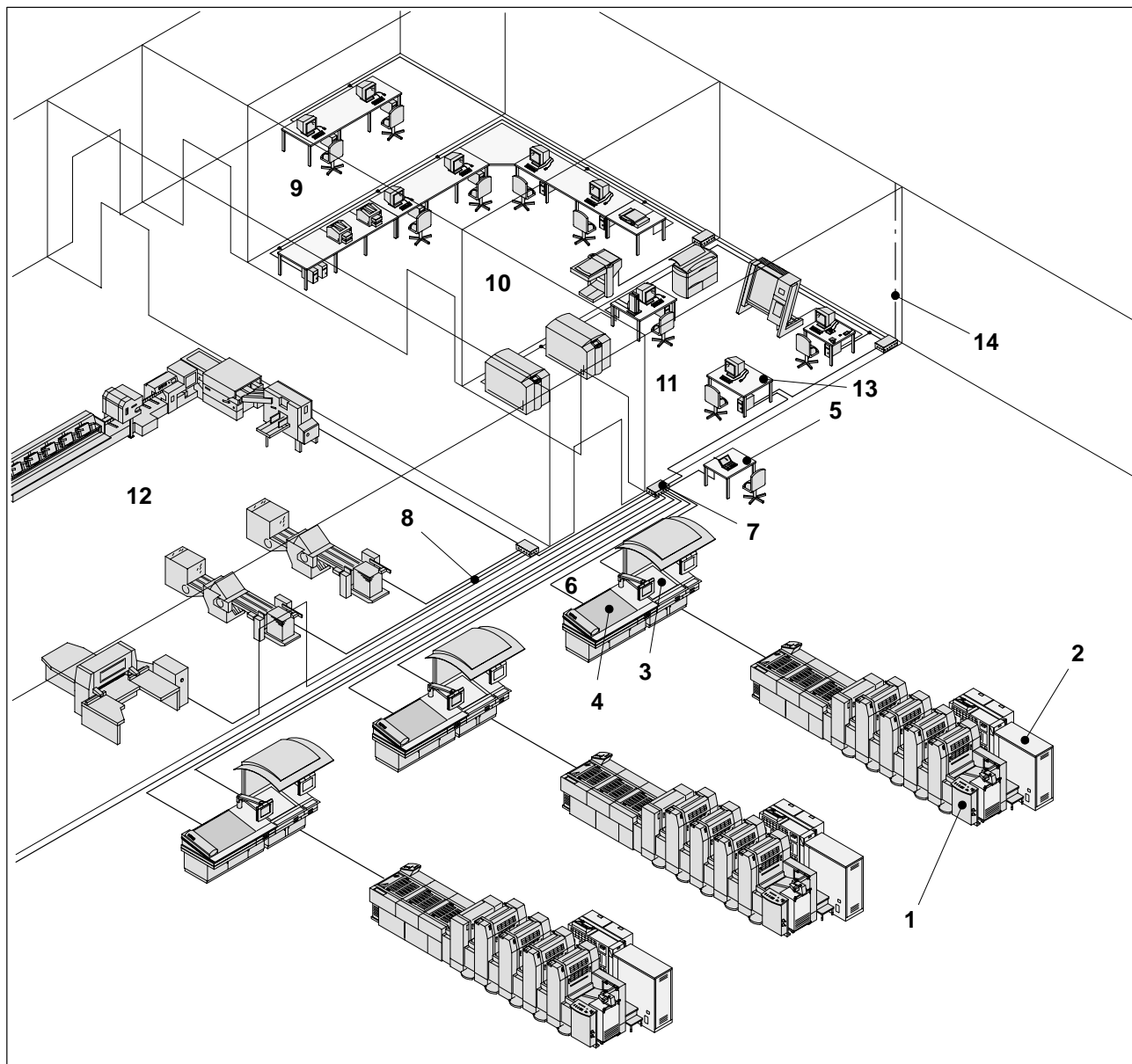


Fig. 5 Network version 5: Connecting several printing presses and several peripherals to an existing print shop network by means of a router

- ① Speedmaster SM 52 printing press
- ② Central control cabinet ZSG
- ③ CP2000 Center with CP2000 software
- ④ ImageControl; this device has a direct data connection to the CP2000 Center and is additionally equipped with its own network board.
- ⑤ Network connection, e.g. for connecting a service notebook
- ⑥ Local area network (LAN; here: Ethernet) for Heidelberg presses and peripherals ("HDM network")

- ⑦ Hub
- ⑧ Existing print shop network
- ⑨ Production control area with DataControl and special trade software
- ⑩ DTP area (desktop publishing) with PCs, scanners and printers
- ⑪ Pre-press area with pre-press interface, RIPs (Raster Image Processors), proofing equipment, image setters/developers and CPC31 (plate image reader)
- ⑫ Post-press area with cutting and folding machines and gatherer-stitchers
- ⑬ Windows NT PC as router, DHCP server and WINS server. Equipped with two network cards.
- ⑭ Connection to another local area network (e.g. administration)

1.8 Selecting a suitable network version

If the version used in the print shop can freely be selected, version 5 should be implemented. This is the optimum solution.

Versions 1, 2 and 3 are suitable solutions, too.

Albeit version 4 is technically feasible, it should be avoided for reasons of data integrity.

2 Suitable network servers and their configurations

2.1 Server PC requirements

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The server PC plays a central role within the network structure. Among other functions, it can have the function of a router. A breakdown of this PC can lead to operation disruptions because the individual network clients (presses and devices) cannot communicate anymore. This also means that the online connection is no longer available.

Therefore the failure safety of the PC is very important. To ensure fail-safe operation, the server PC should meet the following specifications:

Special hardware requirements

- System components of high technical standard, particularly with regard to hard disks and fans;
- redundant power supply units;
- uninterruptible power supply (UPS) as an emergency power supply in the event of a power failure;
- redundant and mirrored hard disks (two hard disks in the server PC).

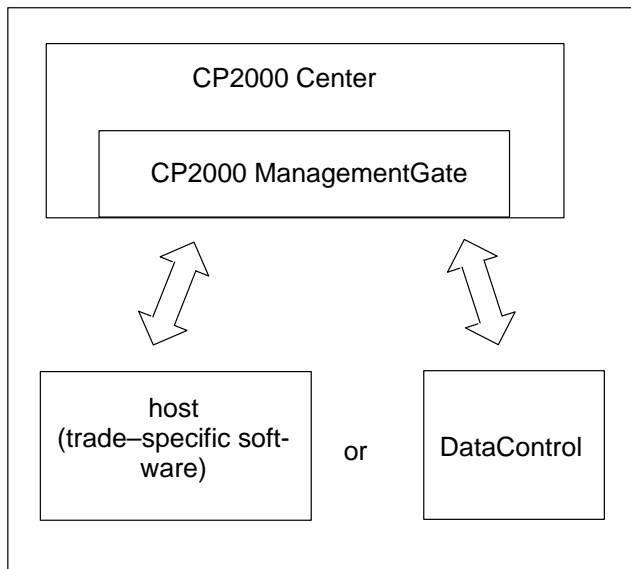
System requirements

- PC: Windows-NT-PC, fully compatible with Windows NT 4.0 according to the Hardware Compatibility List (HCL) by Microsoft;
- Processor: Intel Pentium II with a clock frequency of at least 200 MHz;
- Main memory (RAM): min. 64 MB;
- Graphics board: min. standard VGA;
- Hard disk: min. 4 GB unused hard disk capacity;
- Monitor: min. standard VGA, corresponding to the graphics board;
- Network board: Ethernet board according to the following specifications:
 - Data transmission rate: 10 Mbps or 100 Mbps (megabits per second); auto-sensing function;
 - suitability for Ethernet cabling with RJ45 connectors;
 - at least two ports for connection to one or several hubs (see also Chapter "Network Board");

- one network board for variant 4 (see Chapter "Network Variant 4"), two network boards for variant 5 (see Chapter "Network Variant 5").
- Peripherals: Keyboard, mouse, disk drive (3.5 inch) and CD-ROM drive;
- Operating system: Microsoft Windows NT, English version 4.0 (server version) with "service pack 3";

3 CP2000 ManagementGate

3.1 General information



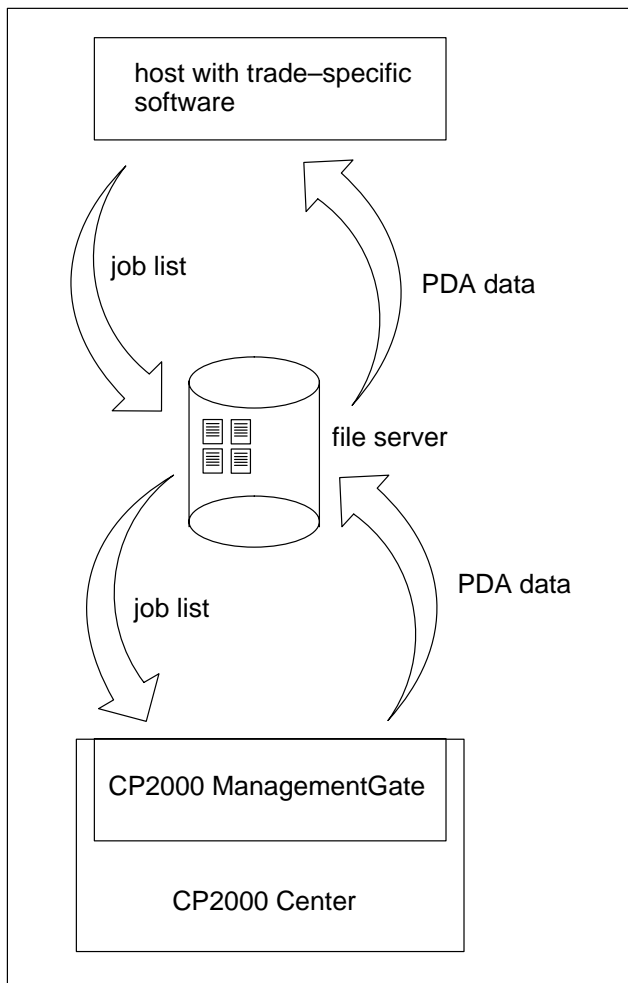
Heidelberger Druckmaschinen AG provides the "CP2000 ManagementGate" software module to support the requirements for an EDP-based integration in order to obtain consistent job handling and production data acquisition for printing presses with CP2000 control systems. CP2000 ManagementGate permits the integration of the printing presses in the pressroom via an open interface to a hierarchically upstream EDP system (trade-specific software).

CP2000 ManagementGate supports the connection:

- to a host (trade-specific software system)
- to DataControl

Fig. 6 Connecting CP2000 ManagementGate with a host or DataControl

3.2 Connecting CP2000 ManagementGate to a host (trade-specific software system)



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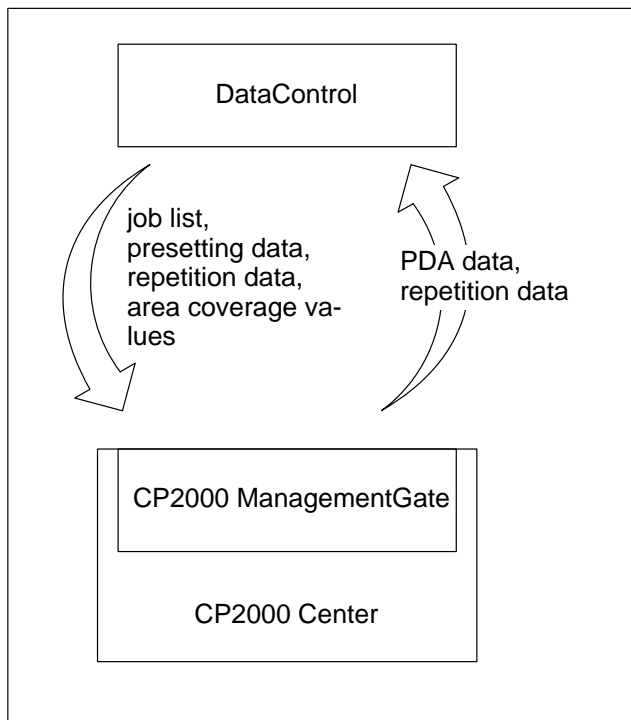
The interface between CP2000 ManagementGate and host complies with the same conventions as the previously introduced interface between DataControl and trade-specific software.

The interface is deliberately kept simple. It is based on a file transfer of ASCII files. The trade-specific software can transfer job data to presses with CP2000 control systems, and receive PDA data from such a press. This does not require a DataControl system to be installed at the customer's.

When the interface was designed, care was taken to provide the best possible decoupling between the systems. The data exchange files that can be read and written with the usual editors facilitate the commissioning and diagnosis work on the interface. A file transfer mechanism permits different computer worlds to be linked with each other.

Fig. 7 Job data transfer between CP2000 ManagementGate and a host

3.3 Linking CP2000 ManagementGate to DataControl



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The connection of CP2000 ManagementGate to DataControl is made via the DataControl Workplace Interface. Thus, the data from the DataControl database (presetting data, inking unit settings, and repetition data) is available at the CP2000 Center. The printing press supplies PDA data to DataControl.

Fig. 8 Data transfer between CP2000 ManagementGate and DataControl

Electrical installation of the printing press

1	General information on the electrical installation	A.4.3
1.1	Warning	A.4.3
1.2	Technical specifications of the electrical equipment.	A.4.3
2	Important information on the mains connection	A.4.5
2.1	Basic instructions	A.4.5
2.2	Basic instructions	A.4.11
3	Connection to the power supply network	A.4.13
3.1	Warning	A.4.13
3.2	General information	A.4.13
3.3	Connection of the printing press	A.4.16

1 General information on the electrical installation

1.1 Warning

This section contains important information regarding the electrical installation of the printing press. This information must be made available to the skilled personnel in charge for planning the installation work to be effected.

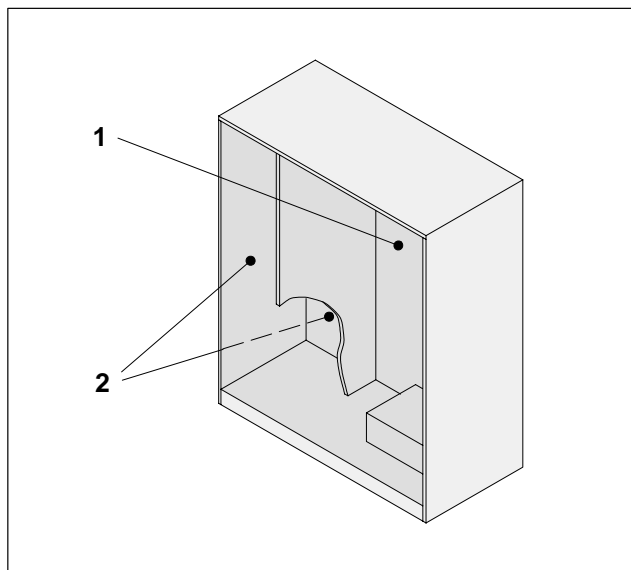


Warning – Danger due to inexpertly effected installation work!
All planning procedures and work to be effected concerning the electrical installation of the press must be arranged by the user of the press and must be carried out by skilled personnel only (see: "Important notes for the user"). In particular, the standards EN 60 204, part 1 and the IEC 204, part 1 as well as the relevant national regulations will have to be observed.

1.2 Technical specifications of the electrical equipment.

The technical specifications of the electrical equipment of the respective press are indicated on the rating plates.

1.2.1 Location of the rating plates



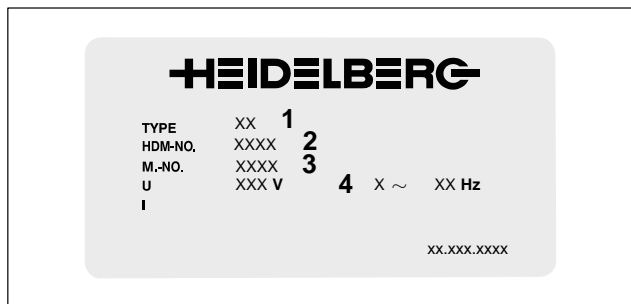
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The rating plates are located at the central control box as follows:

- ① The rating plate for the central control box is located within the insertion zone for electrical equipment and electronics.
- ② The rating plate for the electrical equipment of the press is located outside the central control box above the cable entry and inside the central control box within the range of the electric mains, left beside the main switch.

Fig. 1 Rating plates at the central control box

1.2.2 Rating plate of the central control box

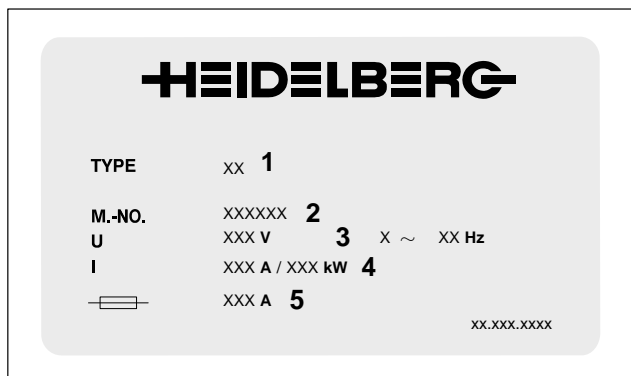


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- ① Press model
- ② HDM part number
- ③ System number
- ④ Mains voltage required, type of voltage and mains frequency

Fig. 2 Rating plate of the central control box

1.2.3 Rating plate of the electrical equipment of the press



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- ① Press model
- ② Press serial number
- ③ Mains voltage required, type of voltage and mains frequency
- ④ Nominal current and nominal power
- ⑤ Recommended building-side back-up fuse

Fig. 3 Rating plate of the electrical equipment

2 Important information on the mains connection

2.1 Basic instructions

2.1.1 Kind of required power supply

For operating the press and its peripheral devices, connections to the following electric networks are required:

- For the power supply of the press, a three-phase network with 3 phases and a ground conductor is required. The phase displacement must be 120°.
- For the power supply of the peripheral devices, an AC network (lighting mains) with 1 phase and a ground conductor is required.

The connections to the three-phase network as well as to the AC network have to meet the following requirements:

2.1.2 Planning of the mains connection

Determination of the mains connection power:

The planning of the mains connections is based on the power required by the press as well as by its peripheral devices. The mains connection must be planned in agreement with the Heidelberg Service. The orientation variables for power requirement and electrical fusing can be found in the "Technical specifications SM 52".

Determination of the reactive power:

The values required to determine the reactive power, like the power factor of the press in normal operation, are indicated on the rating plates. The reactive power can be minimised by a compensation device. A choked compensation should be used to avoid disturbances by upper harmonic waves.

2.1.3 Fuse protection and protection measures



Warning – Danger due to inexpertly effected fuse protection and protection measures!

The following instructions must be observed:

Fuse protection measures

In all current-carrying feeder lines, appropriate fuses must be installed next to the mains tap. Ensure that these fuses are not triggered by the exciting currents which are produced when the press is switched on, since the inrush current of the series transformer can rise briefly to a multiple of the nominal current. The guidance values for the fuses that are listed in the "Technical specifications SM 52" prove sufficient for this purpose.

Protection measures

The ground conductor must be a separate conductor and connected to the protective ground circuit of the printing press.

The ground conductor must be clearly marked by its shape, arrangement, colour or marking. If the marking is effected by colour, the ground conductor must be marked by green and yellow lines along its entire length.

Measures to avoid electromagnetic interference

See subsequent section regarding electromagnetic compatibility of machines and machine sets: "EMC measures".

2.1.4 EMC measures

Printing press and peripheral devices

In order to avoid faults due to electromagnetic interference, the electric and electronic subassemblies of Heidelberger Druckmaschinen AG are designed according to the current EMC regulations and tested in accordance with EN 50081, part 2 and EN 50082, part 2.

Third-party equipment



Caution – Damage and malfunction of electrical devices due to electromagnetic interference!

The following instructions must be observed:

Before using third-party equipment combined with the press, ensure that no disturbances and faults are caused regarding the electronic devices of the press due to electromagnetic interference.

Use third-party equipment combined with the press only, if it meets the EMC requirements according to EN 50081, part 2 and EN 50082, part 2, confirmed by an authorised representative of the manufacturer and if the device is marked by a CE-mark.

Before the installation of third-party equipment within the press, the necessity of EMC measures has to be checked. EMC measures must always be effected in accordance with the Heidelberg Service.

General measures

The following measures to avoid electromagnetic interference should be taken into consideration:

Separate storage and supply:

- Power supply of all outside devices via a separate feeder line and use of appropriate mains filters for the power supply.
- Installation of external controls outside the central control cabinet (ZSG) in a separate, screened casing.
- Separate installation of the three-phase or AC lines from the data control lines.

In case of separate locations and connections to separate power supply networks of the printing press and linked third-party equipment, a potential compensation between both components can easily be achieved. Reliable discharge of equalizing currents requires the equipotential bonding conductor to earth to be of a cross-section of at least 10 mm² (0.016 sq in). Relevant national regulations must also be observed.

Screening and suppression:

- Electrical isolation of the signal lines to the control system as well as screening at both ends of the line.
- Use of screened data and control lines for devices connected to STA interface adapter (see also Chapter "Electronic interfaces").
- Interference suppression at the contactor contacts of one- and three-phase loads by suitable RC elements. Interference suppression of contactor coils and other switching contacts by RC elements for a.c. voltage or interference suppression diodes for d.c. voltage.

2.1.5 Mains tolerances

Tolerances of the power supply



Caution – Damage and malfunction of electrical devices due to inadequate power supply!

Regarding the mains nominal voltage and frequency, the following tolerances must be kept:

- Permissible tolerance of the mains nominal voltage:
Permanent deviations: max. $\pm 10\%$;
- Permissible tolerances of the mains frequency:
Permanent deviations: max. $\pm 1\%$
Short-term deviations: max. $\pm 2\%$.

The voltage losses due to the deviations of the mains nominal voltage including voltage drop between the main power supply (connection to the local power supply) and the terminal voltage at the connection of the press, must be less than 10 %.

Any voltage deviations outside the aforementioned tolerance ranges must be agreed with the Heidelberg Service.

2.1.6 Requirements regarding the power cables

Supply of the supply cables

The cables between the power supply network and the connection of the central control box must be provided and installed by the user of the press.



Warning – Danger due to inexperienced planning and installation!
The following instructions must be observed:

Selection of the conductors

The power cables and ground conductors must be selected in such a way that they are suitable for the existing operating requirements, dimensioned correctly, and resistant to external influences.

Determination of the cross section

The cross section of the power cables and of the ground conductors should meet the requirements of the respective printing press. The maximum cross-section of the conductor terminals in the central control box (ZSG) must be observed (see Section "Mains connection of the printing press"). The following factors should be considered during planning:

- Connection side:
Characteristic data of the fusing of mains connection and main switch (safety switch) and characteristic data of back-up fuse (see Sections "Mains connection of the printing press").
- Cable side:
Guidance, length and type of the cables as well as the kind of installation and insulation and resistance to short circuits, accumulation, generation of heat and the ambient temperature.
- Press side:
Load current and maximum load

Minimum cross-sections can be found in DIN EN 60204 or IEC 204, for example.

2.1.7 Installation of the mains connections

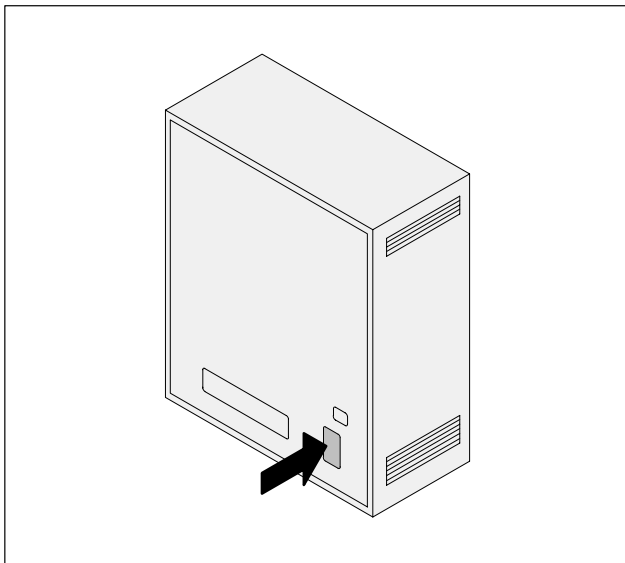


Fig. 4 Cable entry at the central control box

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**Warning – Danger due to inexpertly effected installation work!**

For the installation of the mains connections, the following notes must be observed:

Installation of the cables:

The power cables must be installed expertly by using the corresponding aids (ducts, trays, etc.) to their connection.

Installation of the connections:

The installation of the connections must be effected expertly. Connections must not be soldered. Stranded conductors must be fitted with ferrules to prevent splicing.

Fixing of the cable ends:

In order to prevent any excessive strain to be exerted on the cable ends, they must be retained in a suitable form (e.g. cable clamps).

Length of the cables:

Ensure that the power cables are laid with a sufficient length from the cable entry at the central control box to the mains connection terminals in the control box.

Installation:

The installation of the access lines in the control cabinet and the connection of the mains must be effected by skilled personnel assigned by the user.

2.1.8 Verification of the mains connection

**Warning – Danger to man and/or machine!**

During the installation of the mains connection, the skilled personnel assigned by the user must carry out the verification procedures stipulated in the relevant regulations. The following has to be verified in any case:

- Verification whether a clockwise rotating field exists.
- Verification whether the power supply network remains within the voltage tolerances.
- Verification whether the cross section of the cables and of the ground conductor is sufficient.
- Verification whether an expert, complete connection of the protective ground system of the printing press with the ground conductor exists.
- Verification, whether the fuse protection of the mains connection is sufficient.

2.2 Basic instructions

2.2.1 Planning the mains connection

Central connection

The electrical equipment of the press supplied via the central control box must be connected to a separate mains connection. This installation must be clearly arranged and retraceable.

Guidance of the cables

All cables must be laid continuously from terminal to terminal without connectors in between.

2.2.2 Selection and dimensioning of the current and protective conductors

Selection of the current lead material

Copper conductors should be used as current leads and PE conductors. Relevant national regulations should be observed. Required minimum cross sections can be found in DIN EN 60204 or IEC 204 for example.

Dimensioning of the current leads

To ensure that connection or voltage losses between the power supply network (point of supply of the energy supply company) and the printing press are as low as possible, the cross sections of the power cables should be as large as possible.

2.2.3 Fuse protection and protection measures

Earth-leakage circuit-breaker

We urgently recommend not to use earth-leakage circuit-breakers as triggering through electrical filter measures is to be expected due to small leakage currents (approx. 30 mA).

Fuse protection

When switching on, starting and running up the printing press, the load current may temporarily be at a maximum of 20 % above the nominal current. Fuse protection in the central control box ZSG has been designed accordingly and should only be modified in special cases and after consultation of the Heidelberg Service.

2.2.4 Load behaviour and upper harmonic waves

Load behaviour of the press

During operation (production) the load currents can temporarily be at a maximum of 20 % above the nominal currents.

Upper harmonic waves

To assess the upper harmonic waves under load, an analysis of the respective entire customer system supplied by one separate mains connection is required. For an exact analysis of the effect of electrical devices on the mains, refer to the regulations of EN 60 555 (corresponds to DIN VDE 838) and EN V 61 000 (corresponds to DIN VDE 839).

3 Connection to the power supply network

3.1 Warning

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**Warning – Electrical shock when touching voltage-carrying parts!**

Any electrical installation work may only be carried out by qualified and skilled personnel (see also section "Important notes for the user") and only after having switched off the mains voltage.

The mains connection must be installed according to the specifications from DIN EN 60204, Part 1 and/or IEC 204, part 1. Relevant national regulations should be observed.

The means of connection must be suitable for any occurring electrical, thermal and mechanical stress.

3.2 General information

The user is in charge of the connection to the power supply network in accordance with the aforementioned instructions and regulations. The qualified and skilled personnel assigned by the user will be in charge of the planning and installation of the mains connection.

3.2.1 Preparation of the mains connection

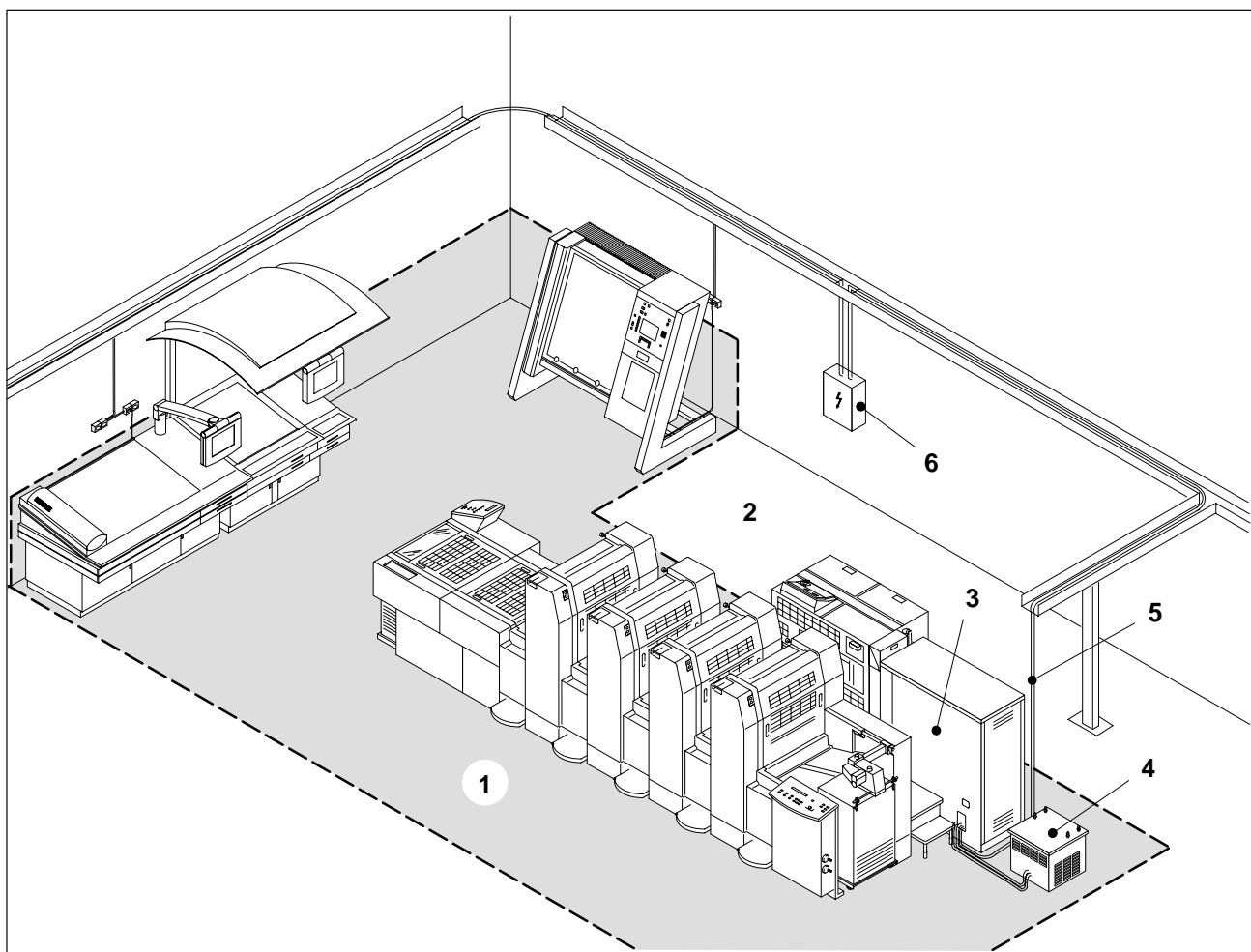
Before connecting the printing press, ensure that the mains connection available:

- has been installed according to the applicable standards and requirements;
- has been checked by qualified experts according to the required test procedure;
- ensures the necessary power delivery as indicated on the rating plate of the press.

3.2.2 Limits of the range of responsibility

The limits of the range of responsibility relevant for the electrical installation between the customer and Heidelberg Service will become evident due to the following illustration:

- ① Responsibility of the Heidelberg Service (grey).
- ② Responsibility of the customer.
- ③ Central control box (ZSG)
- ④ Series transformer
- ⑤ Three-phase current mains
- ⑥ Back-up fuses



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Fig. 5 Limits of responsibility regarding the mains connection

3.2.3 Instructions concerning the mains connection

The connection of the press to the mains of the available power supply network must be arranged by the user and carried out by qualified and skilled personnel assigned by the user in accordance with the relevant standards and regulations.

Connection of the printing press

In general, the printing press has to be connected to the three-phase mains via the central control box (ZSG). Consider the indications on the rating plates.

Apart from the printing press, further devices are supplied via the central control box (ZSG):

- The CP2000 Center or the CPC 1-04 control console with CPTronic central control console;
- the QualityProof quality assurance;
- several additional supply devices (e.g. dampening solution device, temperature control device of the inking unit, powdering device, coating supply device, etc.).

Voltage adaptation and mains frequency

In case of presses designed for a mains frequency of 50 Hz and supply voltages of 380, 400 and 415 V (AC) a direct connection is possible, otherwise an adaptation to the existing power supply network becomes necessary. An adaptation will have to be effected in case of:

SM 52-1 and SM 52-2 (compact electronics)

by means of an adaptation and control transformer integrated in the central control box (ZSG).

SM 52-2 and from SM 52-4 onwards (modular electronics)

via a separate series transformer which is delivered with the press and is always installed by the Heidelberg Service.

Notes concerning the adaptation

The adaptation will concern the control and/or the drives.

For the printing press control, an input voltage of 400 V (AC) is required, the control either demands a power supply of 50 Hz or 60 Hz.

The service voltage of the drives is 400 V (AC) at a mains frequency of 50 Hz.

In case of printing presses designed for 60 Hz, the voltage is increased to 480 V (AC) by means of a series transformer in order to be able to use devices with a frequency-related operating point (e.g. asynchronous motors).

3.3 Connection of the printing press

The skilled personnel assigned by the user will be responsible of the expertly effected installation and connection of the lines in the central control box (ZSG).

3.3.1 Installation of the mains connection

The connection of the press to the power supply network is carried out in case of:

SM 52-1 and SM 52-2 (compact electronics),

at the terminals of the main switch in the central control box (compact design).

SM 52-2 and from SM 52-4 onwards (modular electronics),

at the appropriate terminal strip in the central control box (modular design). Consider the connection variants A1 to A5.

The terminals to be connected are indicated in the connection diagrams delivered with the press.

When connecting the mains, take into account the maximum cross sections of the terminals.

When using multi-wire round leads, the following cross sections in the following areas are allowed:

Maximum cross section at the connection terminals		Cross sections			
		minimum		maximum	
mm ²	sq in	mm ²	sq in	mm ²	sq in
50	0.077	16	0.025	50	0.077
70	0.108	16	0.025	70	0.108
150	0.232	16	0.025	150	0.232

Tab. 1 Cross sections

3.3.2 Size of the connection terminals

SM 52-1 and SM 52-2 (compact electronics)

Maximum cross section of the connection terminals for all voltages and types:

- 50 mm² (0.077 sq in)

SM 52-2 and from SM 52-4 onwards (modular electronics)

Depending on the press type and the available voltage, terminals of different sizes are required. The indications of the following table are valid for one press type (e.g. SM 52-5) and all its variants (e.g. -P, -H, -L etc.).

Nominal data of three-phase network		Maximum cross section at the connection terminals							
Mains frequency [Hz]	Voltage (AC) [V]	SM 52-2		SM 52-4		SM 52-5		SM 52-6	
		[mm ²]	[sq in]	[mm ²]	[sq in]	[mm ²]	[sq in]	[mm ²]	[sq in]
50	200	50	0.077	150	0.233	150	0.233	150	0.233
	208								
	220								
	350								
	380			50	0.077	70	0.110	70	0.110
	400								
	415								
	440								
60	200	50	0.077	150	0.233	150	0.233	150	0.233
	208	50*	0.077*						
	220								
	230								
	240	50	0.077	50	0.077	70	0.110	70	0.110
	380								
	440								
	480								
	600								

Tab. 2 Cross sections of the connection terminals

(*) = SM 52-2 only, design for USA/Canada:

Cross sections of the connection terminals for 60 Hz and 208, 220, 230 and 240 V(AC):

- 150 mm² (0.233 sq in)

3.3.3 Variants of the mains connection

SM 52-2 and from SM 52-4 onwards (modular electronics)

If necessary, presses with modular electronics employ a series transformer for voltage matching. Depending on the existing power supply, several connection variants are possible.

When connecting the printing press, the variant relevant for the corresponding power supply network has to be taken into consideration according to the following table:

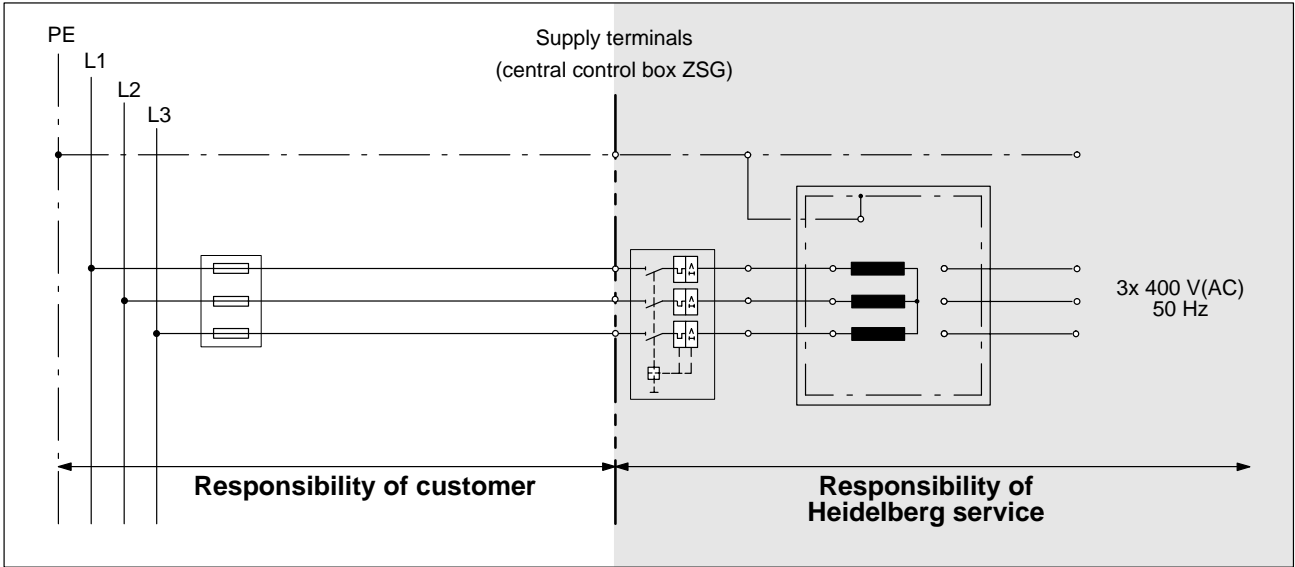
Mains frequency [Hz]	Voltage (AC) [V]	Admissible connection variant
50	200	A1
	208	
	220	
	350	
	440	
	380	A3
	400	
415		
60	200	A2
	208	
	220	
	230	
	240	
	440	
	600	
	380	A4
	480	A5

Tab. 3 Connection variants

Mains connection, variant A1

Admissible voltages:

50 Hz / 200, 208, 220, 350, 440 V(AC)



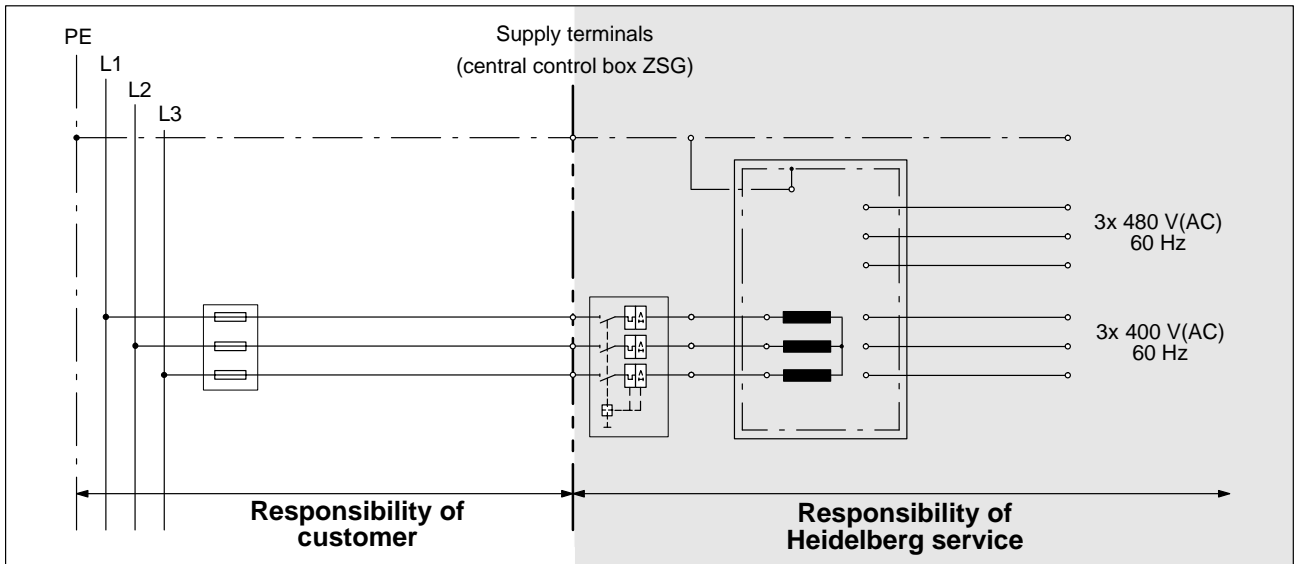
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Fig. 6 Mains connection, variant A1

Mains connection, variant A2

Admissible voltages:

60 Hz / 200, 208, 220, 230, 240, 440, 600 V(AC)



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Fig. 7 Mains connection, variant A2

Mains connection, variant A3

Admissible voltages:
50 Hz / 380, 400, 415 V(AC)

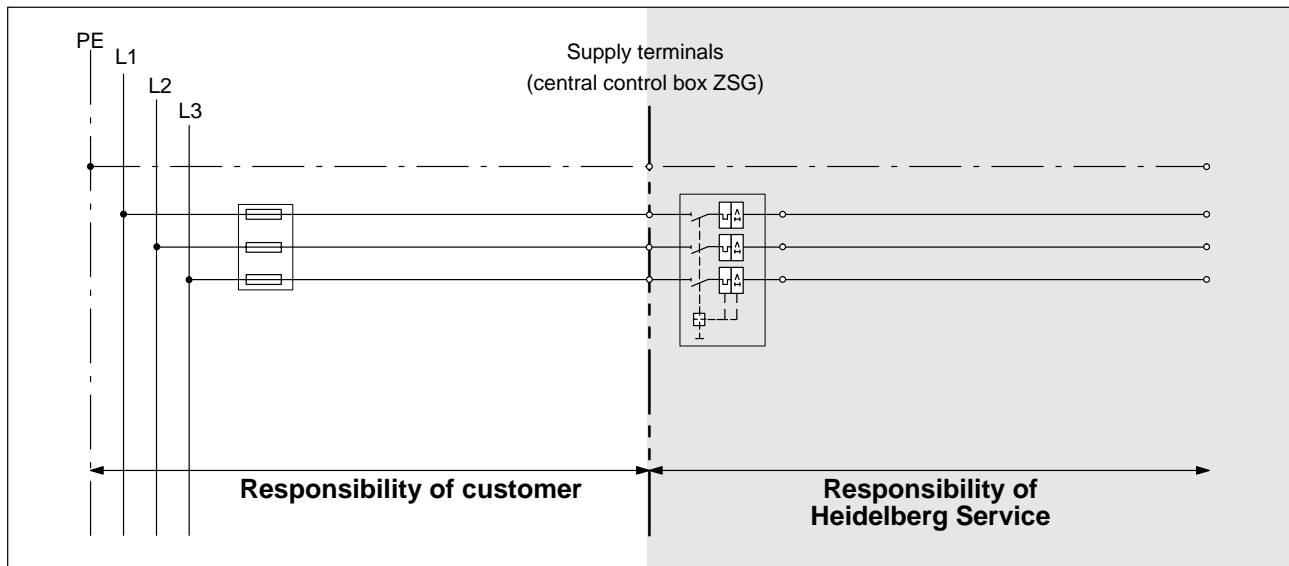


Fig. 8 Mains connection, variant A3

Mains connection, variant A4

Admissible voltage:
60 Hz / 380 V(AC)

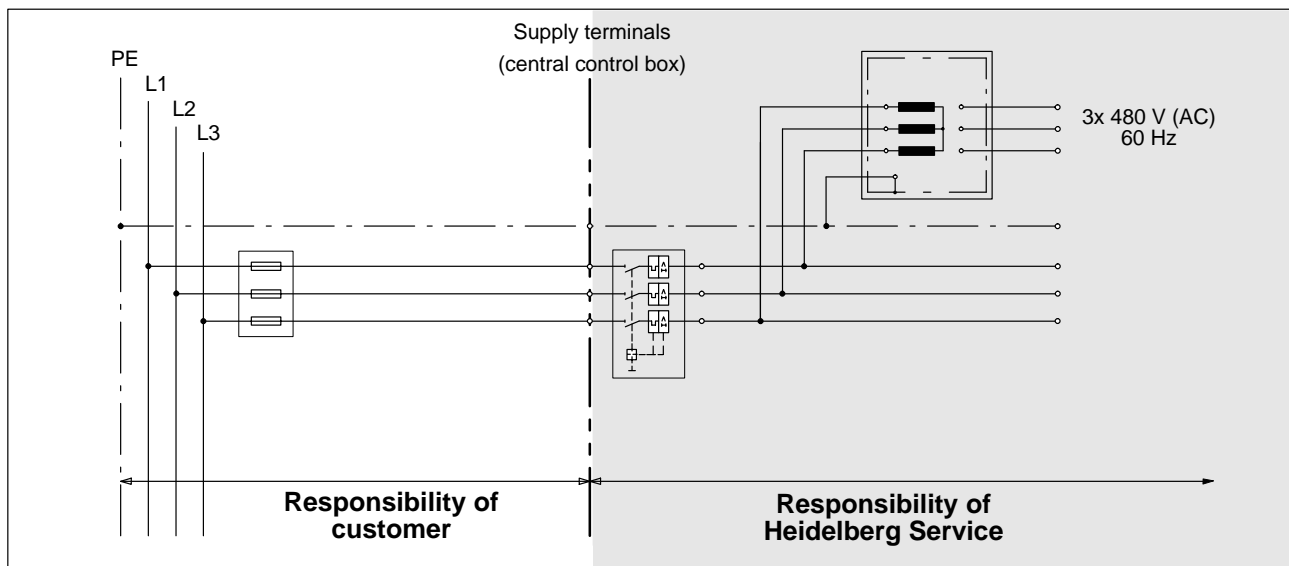
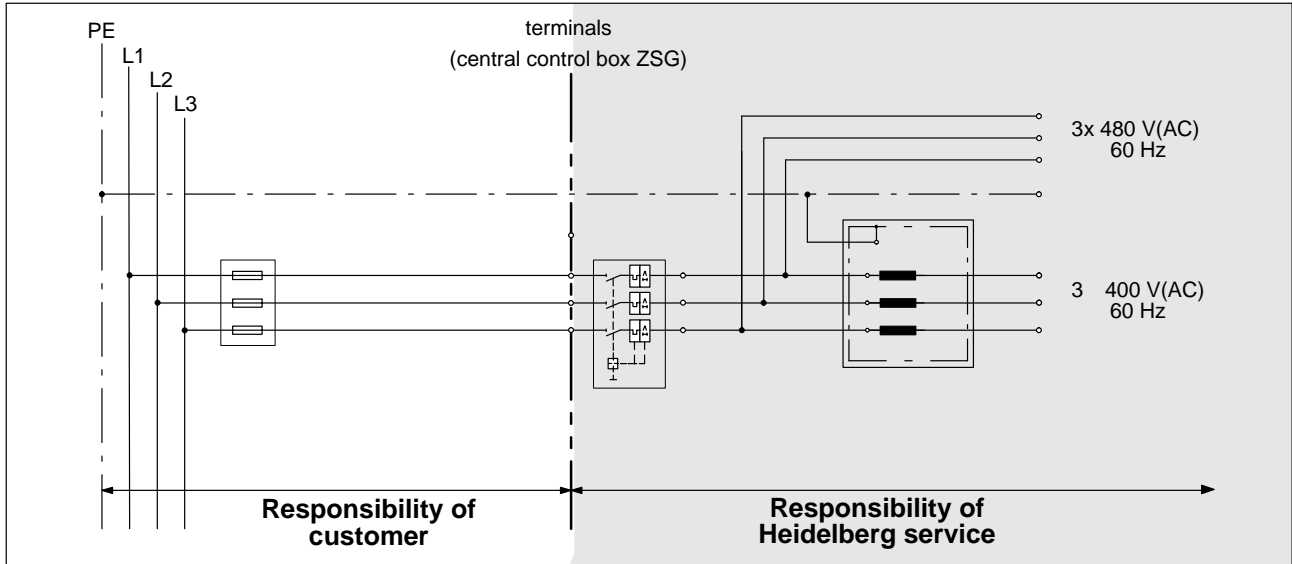


Fig. 9 Mains connection, variant A4

Mains connection, variant A5

Admissible voltage:
60 Hz / 480 V(AC)



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Fig. 10 Mains connection, variant A5

Installation of the peripheral devices

1	Installation of Prinect peripheral equipment	A.5.3
1.1	Warning	A.5.3
1.2	Installation of the CP2000 Centers	A.5.3
1.3	Electrical installation of Prinect peripheral equipment	A.5.4
2	Installation of supply units	A.5.8
2.1	Instructions for the installation of supply units	A.5.8

1 Installation of Prinect peripheral equipment

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1.1 Warning

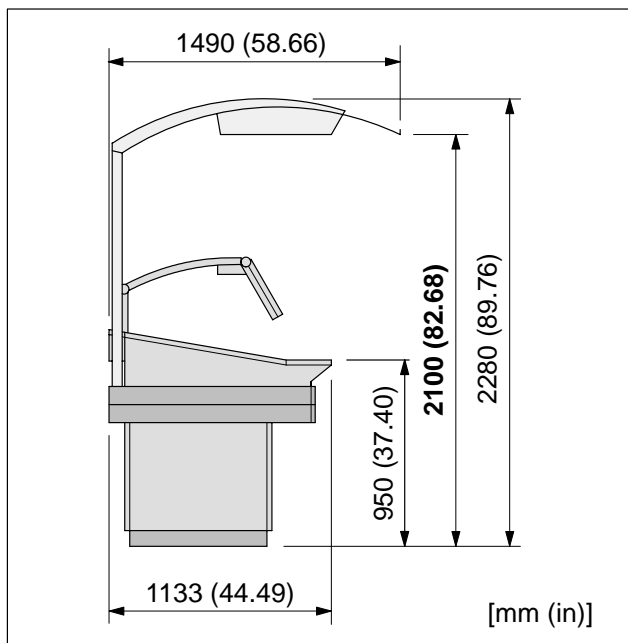


Warning – Danger due to inexpertly effected installation work!
 All planning procedures and work to be effected concerning the installation of peripheral devices, must be arranged by the user and carried out by skilled personnel only (see also section "Definition of skilled personnel"). The relevant national regulations must be observed.

This section must be made available to the skilled personnel in charge, in order to plan the installation work to be effected.

Additional information can be found in the Section "Notes on the preparation of the press location".

1.2 Installation of the CP2000 Centers



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Warning – hazard due to inexpert installation !
 When installing the CP2000 Center you must ensure that the protruding standard daylight lamp does not jut out into the area of elevated working surfaces. This affects chiefly the areas of the foot steps on D.S.

Further information about the installation of the CP2000 Center can be found in the floor plans of the "Technical specifications SM 52".

Fig. 1 Side view of the CP2000 Center

1.3 Electrical installation of Prinect peripheral equipment

The following section contains information and notes about the electrical installation of Prinect peripheral equipment.

1.3.1 Warning



Warning – Electrical shock when touching voltage-carrying parts!

Any electrical installation work may only be carried out by skilled personnel (see also section "Important notes for the user") and only after having switched off the mains voltage.

The connection to the power supply network must be effected in accordance with the standards DIN EN 60204, part 1 and IEC 204, part 1 . Please observe the relevant national regulations.

The means of connection must be suitable for any occurring electrical, thermal and mechanical stress.

1.3.2 General information

Making available the mains connection

The user is in charge of the connection to the power supply network in accordance with the aforementioned instructions and regulations. The qualified and skilled personnel assigned by the user will be in charge of the planning and installation of the mains connection.

Limits of the range of responsibility

The limits of the range of responsibility relevant for the electrical installation between the customer and the Heidelberg Service will become evident due to the following illustration:

- ① Responsibility of the Heidelberg Service (grey).
- ② Responsibility of the customer.
- ③ CP2000 Center
- ④ ImageControl
- ⑤ Plate Image Reader (pre-press stage)
- ⑥ AC mains
- ⑦ Back-up fuses

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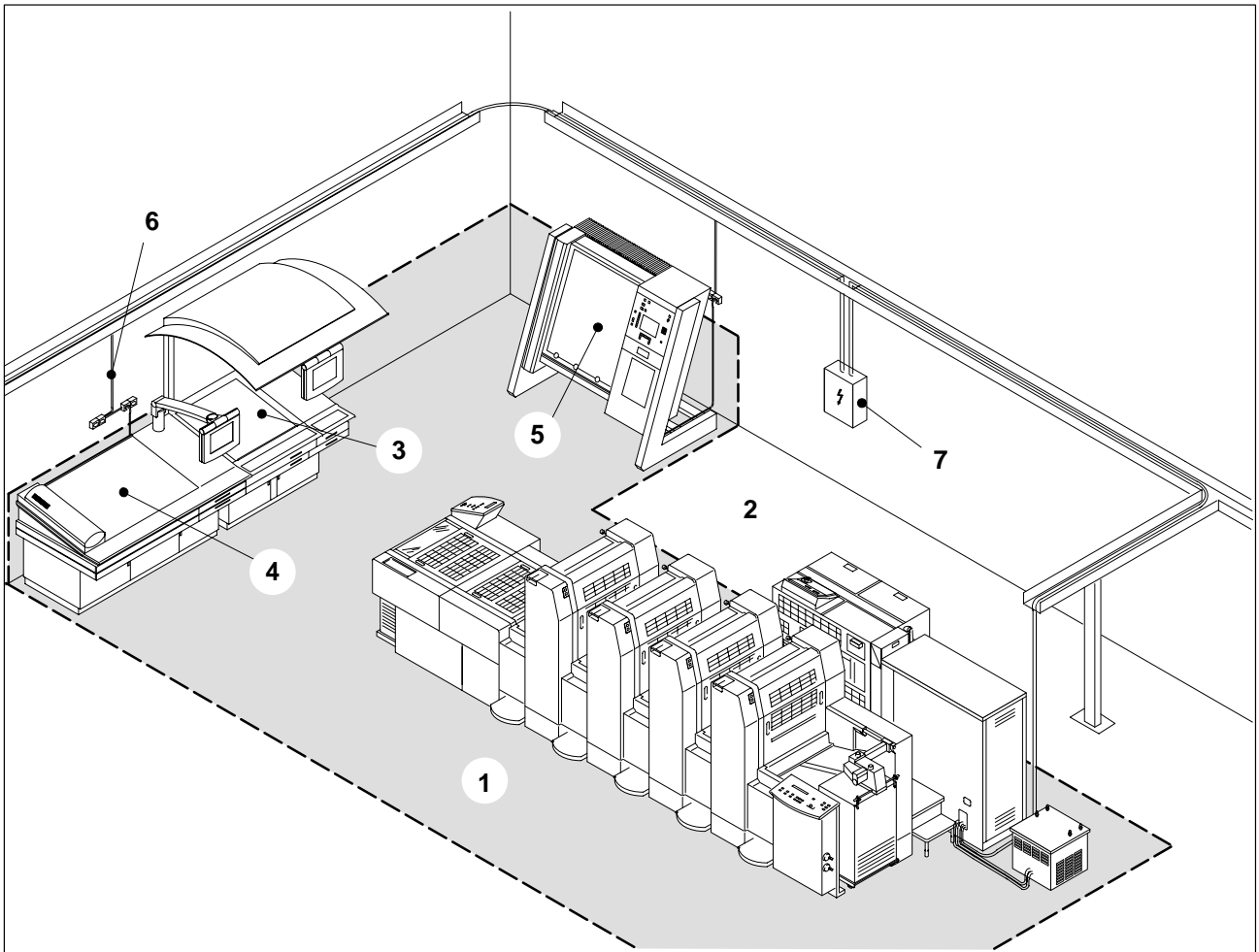


Fig. 2 Limits of responsibility regarding the mains connection

1.3.3 Connection of Prinect peripheral equipment

Note

Please contact Heidelberg Service to agree the connection if the tables below do not permit any clear allocation to be made for a Prinect peripheral unit.

Electrical power supply

The Prinect peripheral equipment is fed either via the central control box (ZSG) or from the single-phase a.c. mains via a connection that must be provided.

Connection of devices

Heidelberg Service connect devices that are fed via the ZSG or a Prinect peripheral unit.

The separate connection of devices to the AC power supply network must be carried out by skilled personnel assigned by the user.

The kinds of supply and connections required for each special device are indicated in the following table:

Version	Power supply by:				Connection by:	
	ZSG	CP2000 Center	CPC 1-04 control console	AC	Heidelberg	Customer
CP2000 Center	o				o	
CPTronic control console	o				o	
CPC 1-04 control console	o				o	
Standard daylight lamp for CP2000		o			o	
Standard daylight lamp for CPC 1-04			o		o	
ImageControl				o		o
QualityControl				o		o
QualityProof	o				o	
Plate image reader				o		o

Tab. 1 Electrical power supply and connection of Prinect peripheral equipment

Preparing the mains connection

Before connecting the devices, the skilled personnel assigned by the user has to adapt the devices to the voltage and to the frequency of the local AC power supply network according to the following table.

The plug of the connection cable delivered with the press has to be, if necessary, replaced by a plug according to the local standards which, however, does not belong to the scope of supply.

(°): mains connection possible.

Power supply (AC)		ImageControl	QualityControl	Plate image reader
Nominal voltage [V]	Frequency [Hz]			
100	50	°		°
	60	°		°
110	50	°	°	°
	60	°	°	°
115	50			°
	60			°
120	50	°		°
	60	°		°
125	50		°	°
	60		°	°
145	50		°	
	60		°	
160	50		°	
	60		°	
200	50	°		°
	60	°		°
220	50		°	°
	60		°	°
230	50	°		°
	60	°		°
240	50			°
	60			°
250	50	°	°	
	60	°	°	

Tab. 2 Standard power connection variants of Prinect peripheral equipment

2 Installation of supply units

2.1 Instructions for the installation of supply units

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Connection to external supply units

Printing presses of the series SM 52 are supplied with compressed air, suction and blast air and dampening solutions by means of integrated or combined supply devices. The electrical power supply of these devices is effected via the central control box (ZSG). The connection to external supply devices of the customer has not been taken into account in case of standard SM 52 presses. If a connection to a supply unit of the customer is planned, the technical details will have to be discussed in advance with the Heidelberg Service.

Installation of the supply units

The installation of the supply units and the required connections should be carried out by the Heidelberg Service.

Water supply

For filling the dampening solution devices, the temperature control devices of the inking units as well as for the cooling device of sheet guidance of the high-pile delivery or of the extended delivery, a water supply connection at the location of the press is required.

Exhaust air of IR or coating dryers

If the exhaust air of the dryers (high-pile delivery or extended delivery) is carried off externally, an appropriate aeration device will become necessary. The technical details should be discussed in advance with the Heidelberg Service.

Electronic interfaces

1	Interface adapter STA	A.6.3
1.1	Structure and task	A.6.3
1.2	Block diagram	A.6.5
1.3	Installation location	A.6.6
1.4	STA-X1 terminal strip	A.6.7
1.5	STA-X2 connector	A.6.7
1.6	STA-S3 connector	A.6.8
2	Interface input module SEM	A.6.9
2.1	Structure and task	A.6.9
2.2	Block diagram	A.6.9
2.3	Connections	A.6.10
2.4	Input signals at the SEM	A.6.11
3	Interface output module SAM	A.6.13
3.1	Structure and task	A.6.13
3.2	Block Diagram	A.6.14
3.3	Connections	A.6.14
3.4	Output signals at the SAM	A.6.16
4	Single-Fault Fail-Safe Extension Module EEM	A.6.19
4.1	Task and Function	A.6.19
4.2	Block Diagram	A.6.19
4.3	Connector	A.6.20
5	Press cycle position switch 1S65	A.6.21
5.1	Installation location	A.6.21
5.2	Installation and removal	A.6.21

1 Interface adapter STA

1.1 Structure and task

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The STA interface adapter provides the electrical isolation of the signal lines between the central control box and the auxiliary equipment. The electrical isolation of signal lines serves to protect the CPTronic or CP2000 control system. The interface adapter permits the following additional equipment to be connected, for example:

IR dryer, UV dryer, tape inserter, production recorder, external powder spray device.

The interface adapter contains an SEM interface input module, an SAM interface output module, the STA-X1 terminal strip and the STA-X2 and STA-X3 connectors.

SEM interface input module

The interface input module provides for the isolation of the input signals via optocouplers.

SAM interface output module

The interface output module employs relays for isolating the output signals.

STA-X1 terminal strip

An AC 230 V voltage connection and the press cycle signal from the 1S65 position switch are available at the STA-X1 terminal strip and can be used by additional equipment.

STA-X2 connector

The 1S65 press cycle position switch is connected at the STA-X2 connector.

STA-X3 connector

The signal lines to and from the central control box are routed via the STA-X3 connector.

In case of malfunctions, error messages are output via the press information displays MID and the CID or CCD (production display and fault display).

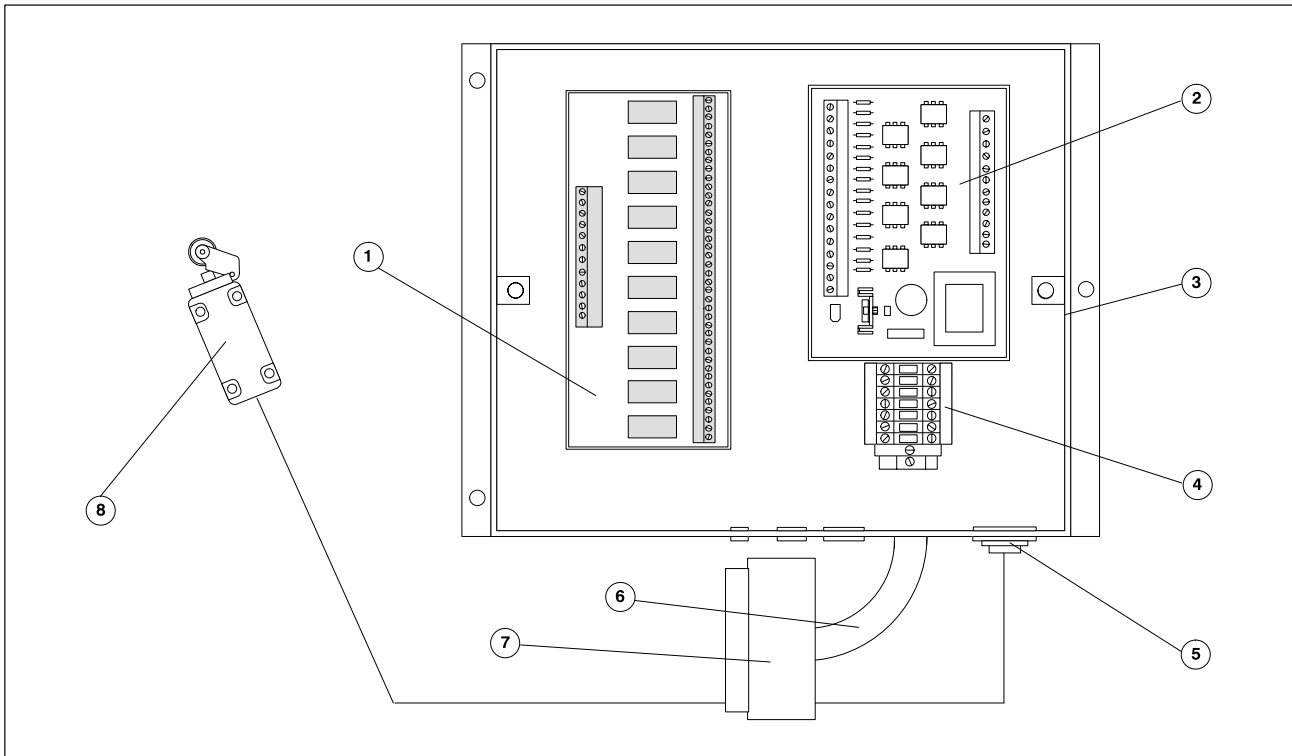


Fig. 1 STA interface adapter

- ① SAM interface output module
- ② SEM interface input module
- ③ Enclosure of the interface adapter
- ④ STA-X1 terminal strip
- ⑤ STA-X2 connector for "press cycle" (1S65) position switch
- ⑥ Line to the central control box
- ⑦ STA-X3 connector
- ⑧ "Press cycle" (1S65) position switch

1.2 Block diagram

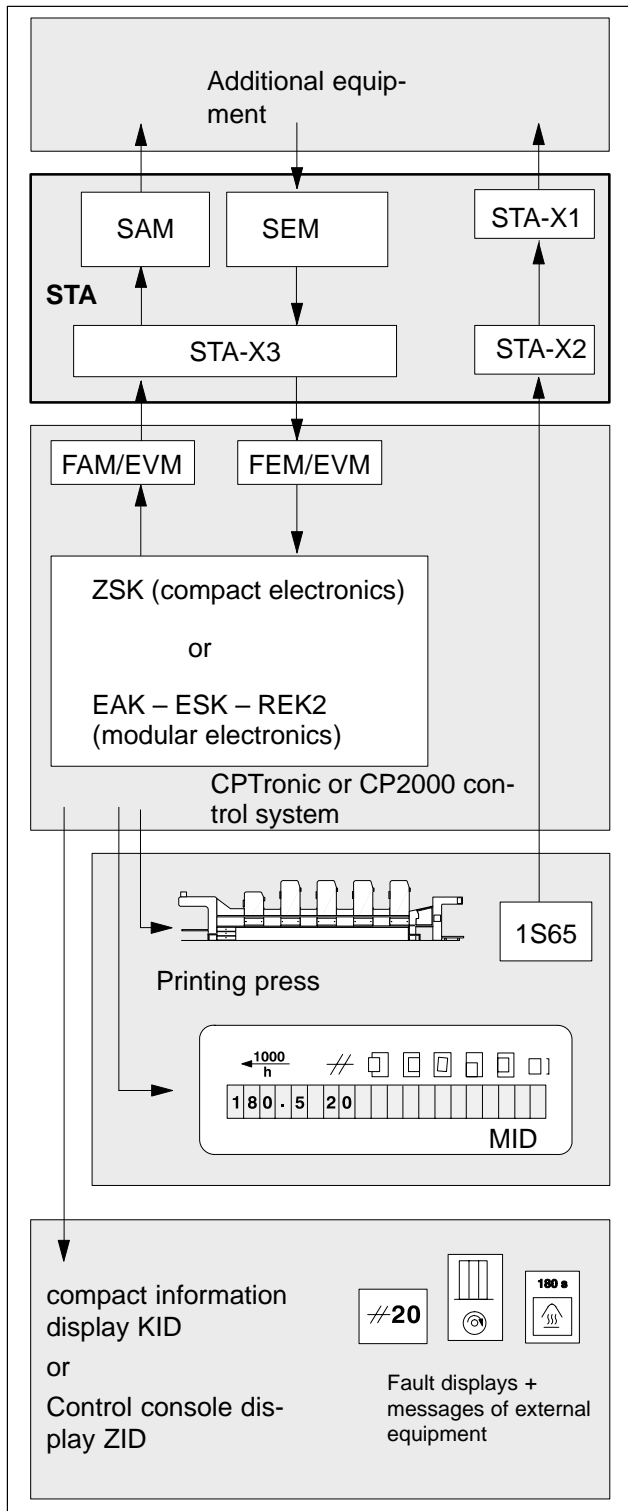
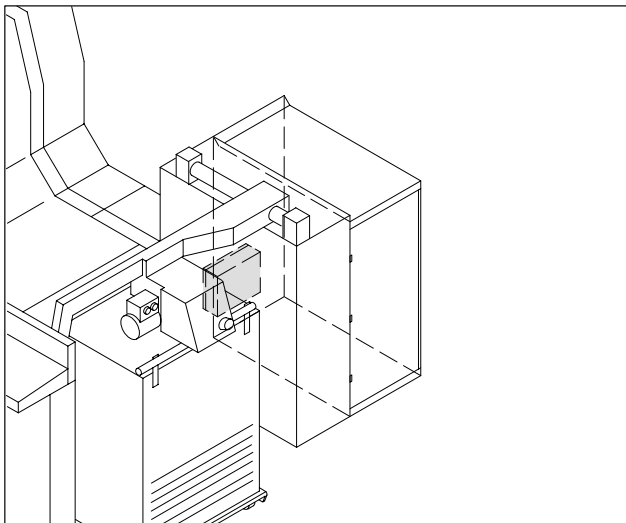


Fig. 2 Signal flow

1.3 Installation location

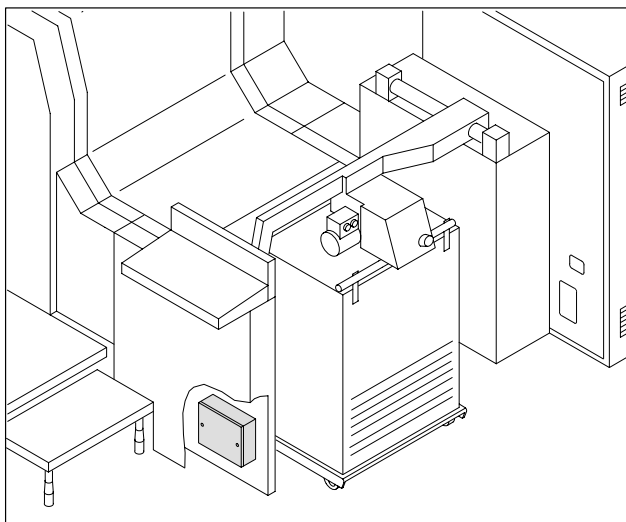


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Installation location on printing presses with compact electronics

The STA is located at the central control box ZSG at the drive side beneath the foot step.

Fig. 3 STA interface adapter at the central control box ZSG



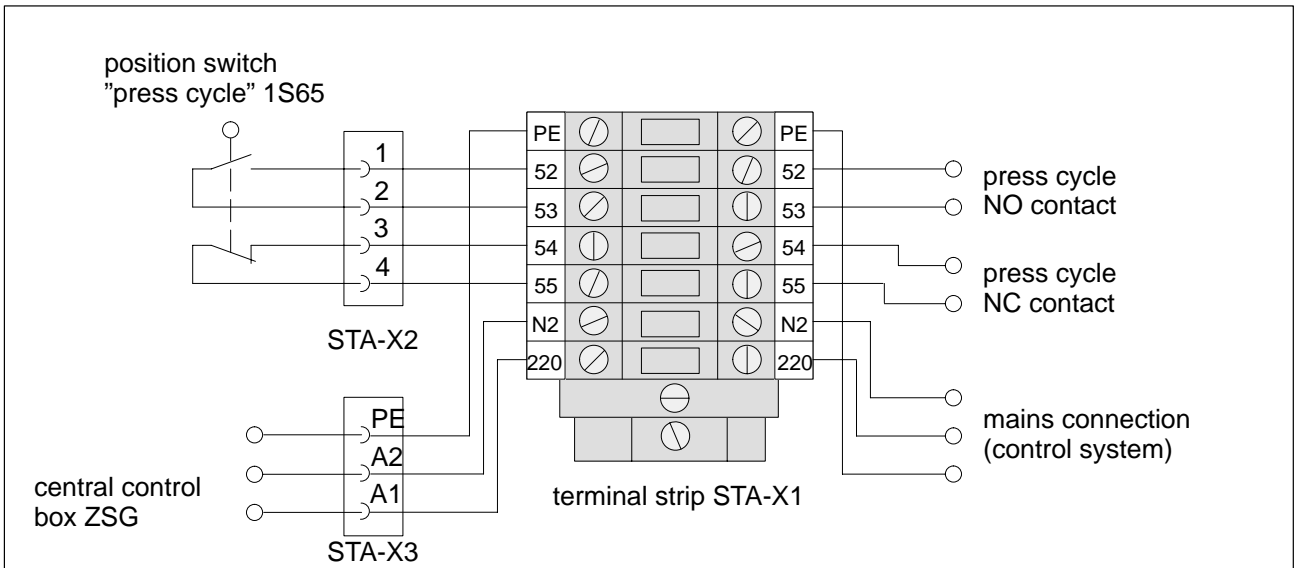
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Installation location on printing presses with modular electronics

The STA is located beneath the feeder control console at the operator's side.

Fig. 4 STA interface adapter at the feeder control console

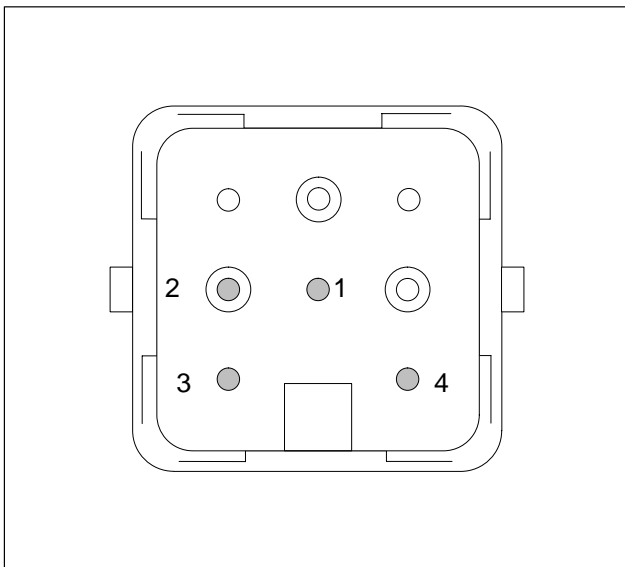
1.4 STA-X1 terminal strip



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Fig. 5 STA-X1 terminal strip

1.5 STA-X2 connector



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Pin	Function
1	NO contact, Switching capacity AC 230 V, 1 A
2	NO contact, Switching capacity AC 230 V, 1 A
3	NC contact, Switching capacity AC 230 V, 1 A
4	NC contact, Switching capacity AC 230 V, 1 A

Tab. 1 STA-X2 connector, switch side

Fig. 6 STA-X2 connector, switch side

1.6 STA-S3 connector

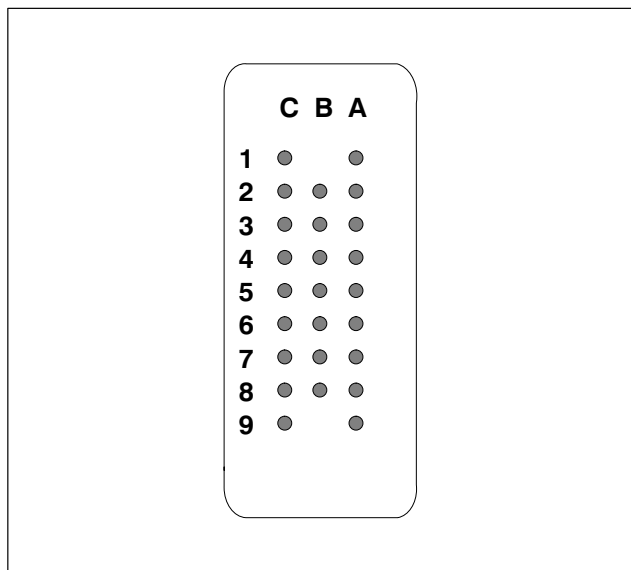


Fig. 7 STA-X3 connector, machine side

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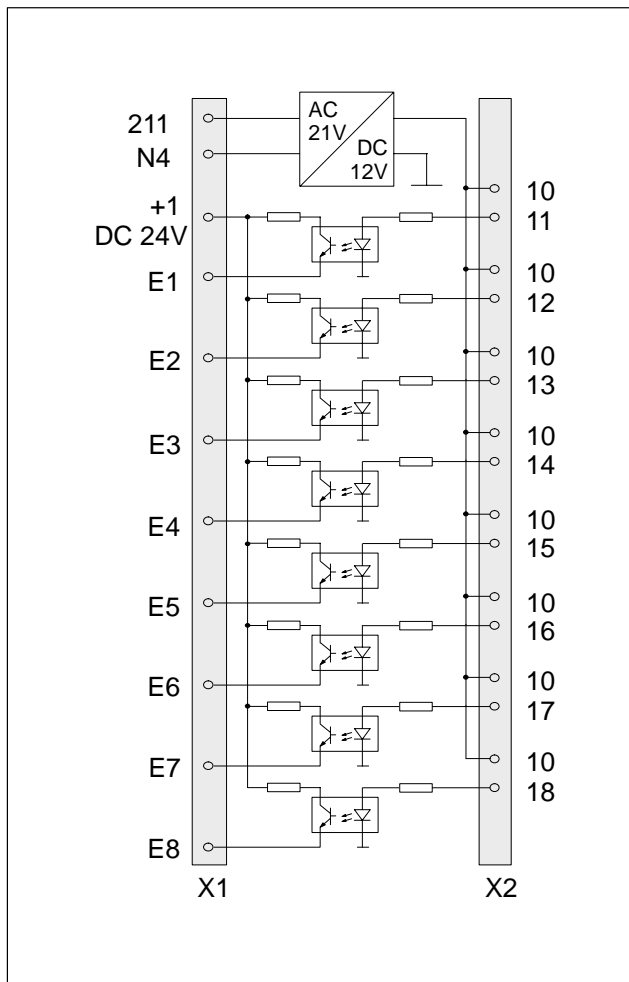
Pin	Function
A1	AC 230 V
A2	AC 230 V, neutral conductor
A3	DC 24 V
A4	Operation
A5	Dryer ON/OFF
A6	Radiator ON/OFF
A7	Paper in PU1
A8	Emergency stop
A9	Printed sheets in delivery
B2	Feeder on
B3	Powder spray device ON/OFF
B4	Emergency stop
B5	UV dryer in operation
B6	Malfunction UV dryer
B7	–
B8	–
C1	Washing after drying permitted
C2	–
C3	–
C4	AC 21 V
C5	AC 21 V neutral conductor
C6	Main drive emergency stop (EEM module)
C7	–
C8	–
C9	–
PE	Protective earth conductor

Tab. 2 STA-X3 connector, machine side

2 Interface input module SEM

2.1 Structure and task

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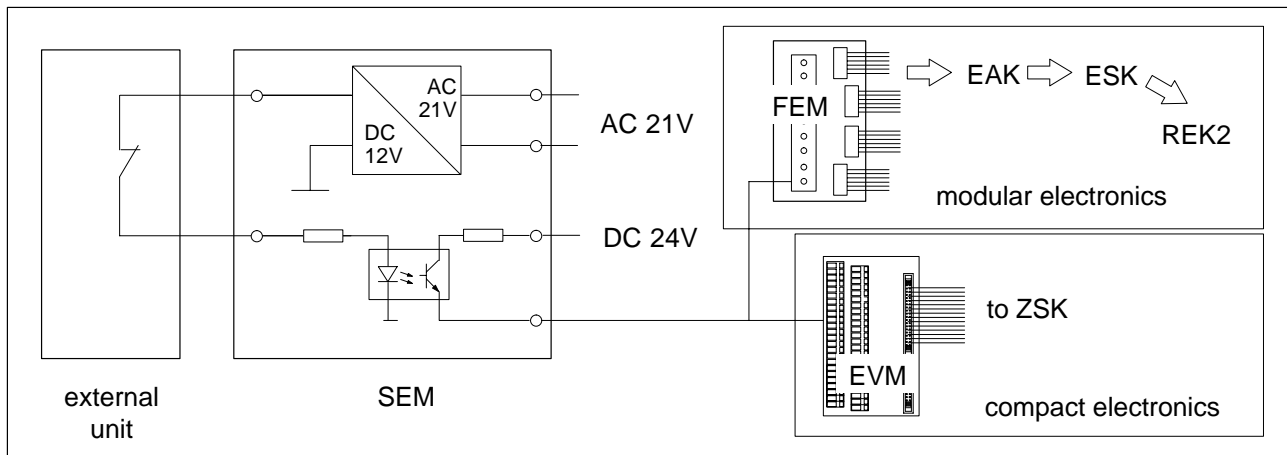
The SEM's task is the isolation between the inputs to the CPTronic or CP2000 control system and the additional equipment.

On the SEM, an auxiliary voltage of DC 12 V is generated out of AC 21 V. This voltage is picked up by the external device and switched back. On the SEM, this voltage is passed on to an optocoupler. It switches DC 24 V:

- of printing presses with modular electronics via FEM, EAK, ESK to REK2;
- of printing presses with compact electronics via EVM to ZSK.

Fig. 8 SEM structure

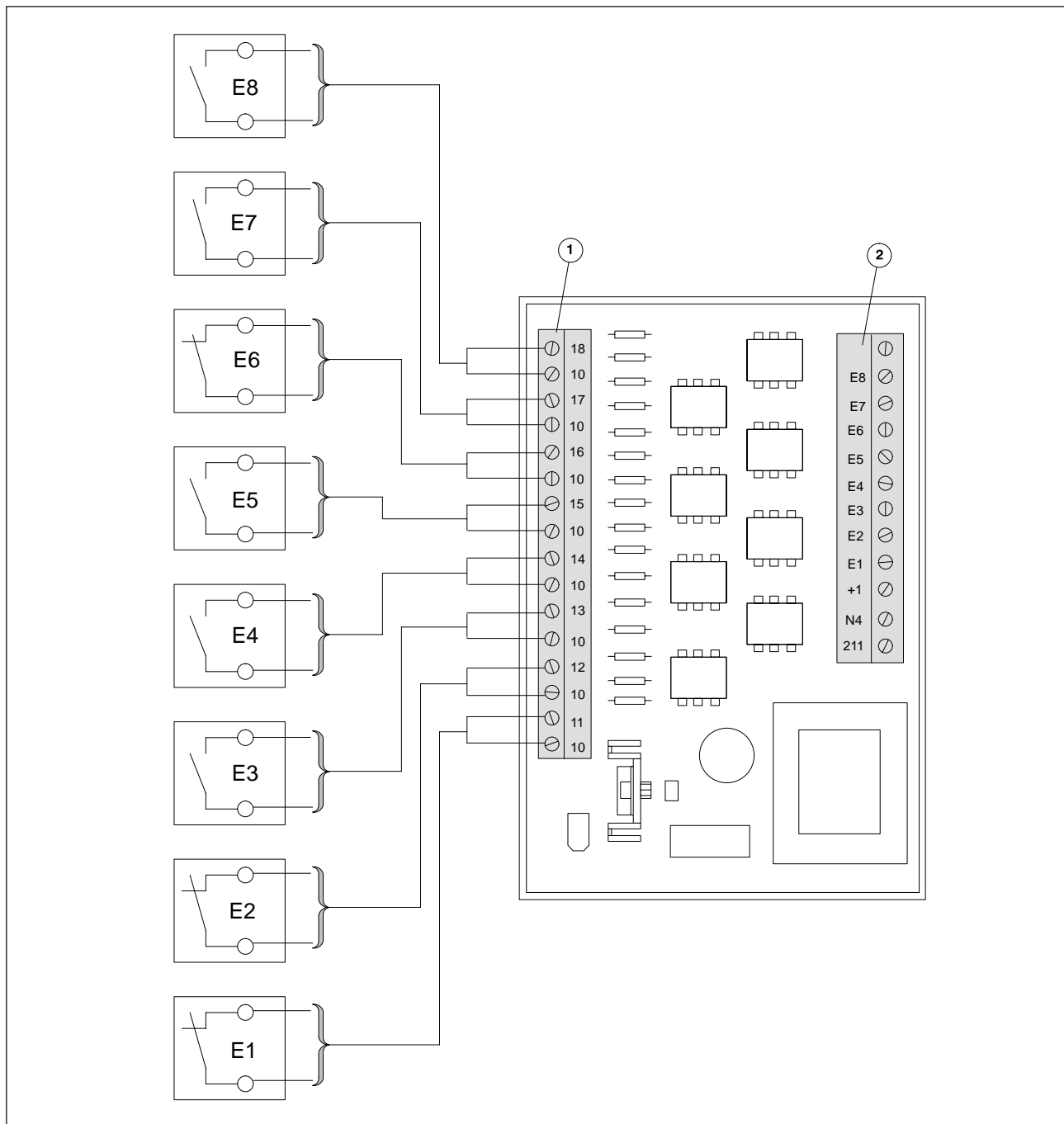
2.2 Block diagram



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Fig. 9 SEM connection structure

2.3 Connections



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Fig. 10 Auxiliary equipment on the SEM

- ① Terminal strip: SEM-X2;
Connections of the auxiliary equipment
- ② Terminal strip: SEM-X1;
Connections to central control box ZSG

The cables of the auxiliary equipment are connected to the SEM-X2 terminal strip of the SEM interface input module.

Connection to terminal	Input	Auxiliary equipment
10 and 11	E 1	Emergency stop
10 and 12	E 2	UV dryer in operation
10 and 13	E 3	UV dryer malfunction
10 and 14	E 4	–
10 and 15	E 5	–
10 and 16	E 6	Dryer blocking after washing
10 and 17	E 7	UV dryer with shutter
10 and 18	E 8	not assigned

Tab. 3 Auxiliary equipment on the SEM

Remove the corresponding jumper when you connect auxiliary equipment

- to terminals 10 and 11
- to terminals 10 and 12
- to terminals 10 and 16

2.4 Input signals at the SEM

UV dryer with shutter

This signal tells the electronic control system that all installed UV dryer units have been equipped with shutters.

Dryer blocking after washing

Once an automatic washup procedure has been completed, the „Dryer ON/OFF“ signal (SAM) is disabled for approximately 180 s.

During this time the position code 20 is displayed in the fault display of press display and CID (production display).

- ▶ **Note**
After an automatic washup procedure has been completed, the UV dryer must rest for 180 s before it can be put back into operation.

Dryer malfunction

A malfunction has occurred in the dryer. The printing press is stopped in a "guided" way. This means that the current state of the press is taken into account („run“, „paper run“ and „production“).

Position code 20 is displayed in the fault display of press display and CID (production display).

UV dryer in operation

Monitoring the gripper bars of the UV dryer without shutter.

The "in-operation" message of the UV dryer is required for monitoring the gripper bars in the delivery. Visual and audible warning signals are issued if the gripper bars are located in the range of the UV radiators when a press standstill occurs. The symbol „grripper bars are in the irradiated zone“ appears under the „Entire press/warnings“ error type in the production display on the control console display. A warning signal at one-second intervals sounds at the same time. If the gripper bars are in this area for more than 1 min, the electronic control system switches off the „dryer ON/OFF“ (SAM) signal.

Locking the washup device:

The signal "UV dryer in operation" is required in addition to lock the washup devices in the printing units.

If the signal "UV dryer in operation" is present, an automatic washup procedure is not possible. Once the "UV dryer in operation" signal has disappeared, the waiting time of 180 s starts. The "dryer waiting time" message and the current waiting time are displayed under the "WASHUP" command in the CID.



Note

The operation of the UV dryer must be stopped for at least 180 seconds before an automatic washup procedure is allowed to be started.

Emergency stop

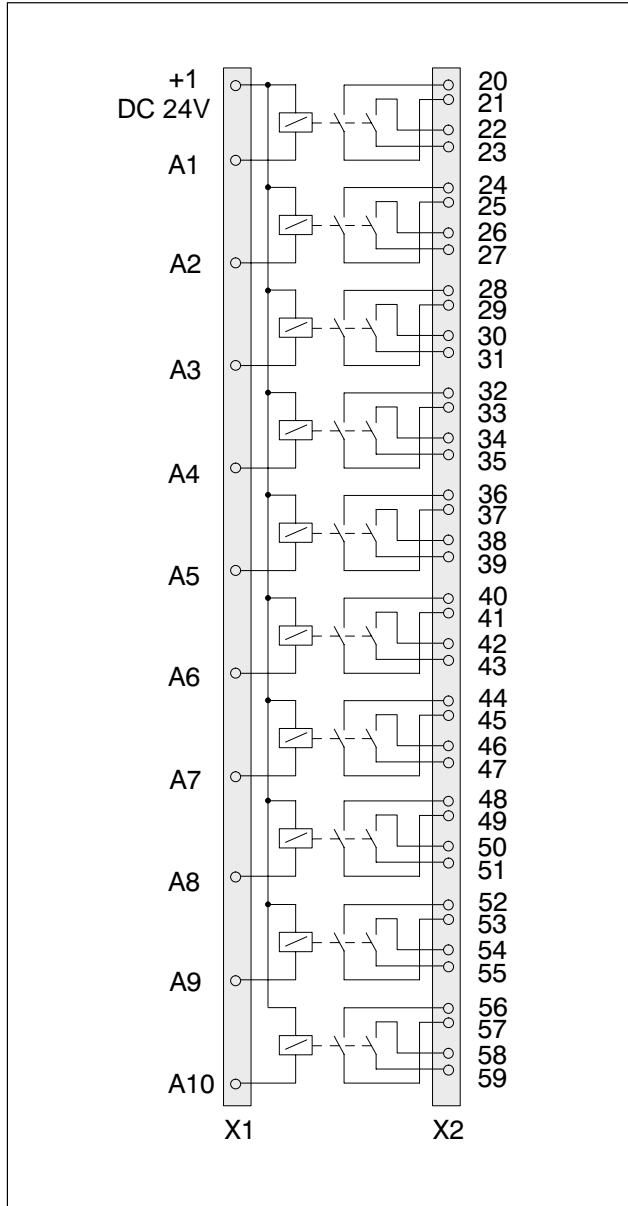
The emergency stop signal stops the printing press as quickly as possible.

The position code 15 appears in the fault display of press display and CID (production display). The symbol "Emergency stop" appears on the CID under the type of error "entire press/press not ready to run".

3 Interface output module SAM

3.1 Structure and task

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The SAM's task is the isolation between the outputs to the CPTronic or CP2000 control system and the additional equipment.

An EAK output (modular electronic) or a ZSK output (compact electronic) to ground activates a relay on the SAM. This enables switching operations to be performed in external units. Groups of two switches each are connected in parallel.

The NO contacts of the relays are able to switch AC 230 V, 1 A directly.

Fig. 11 SAM structure

3.2 Block Diagram

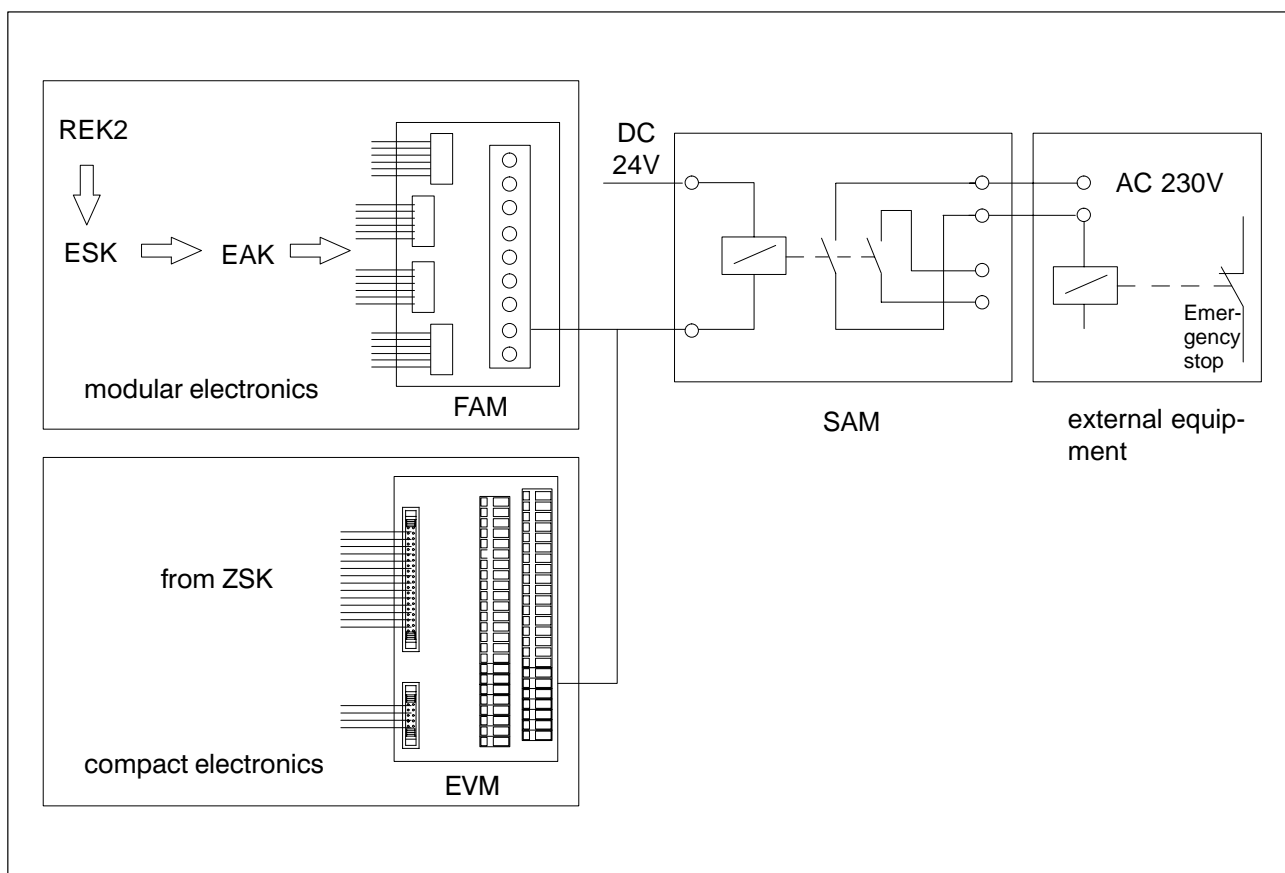


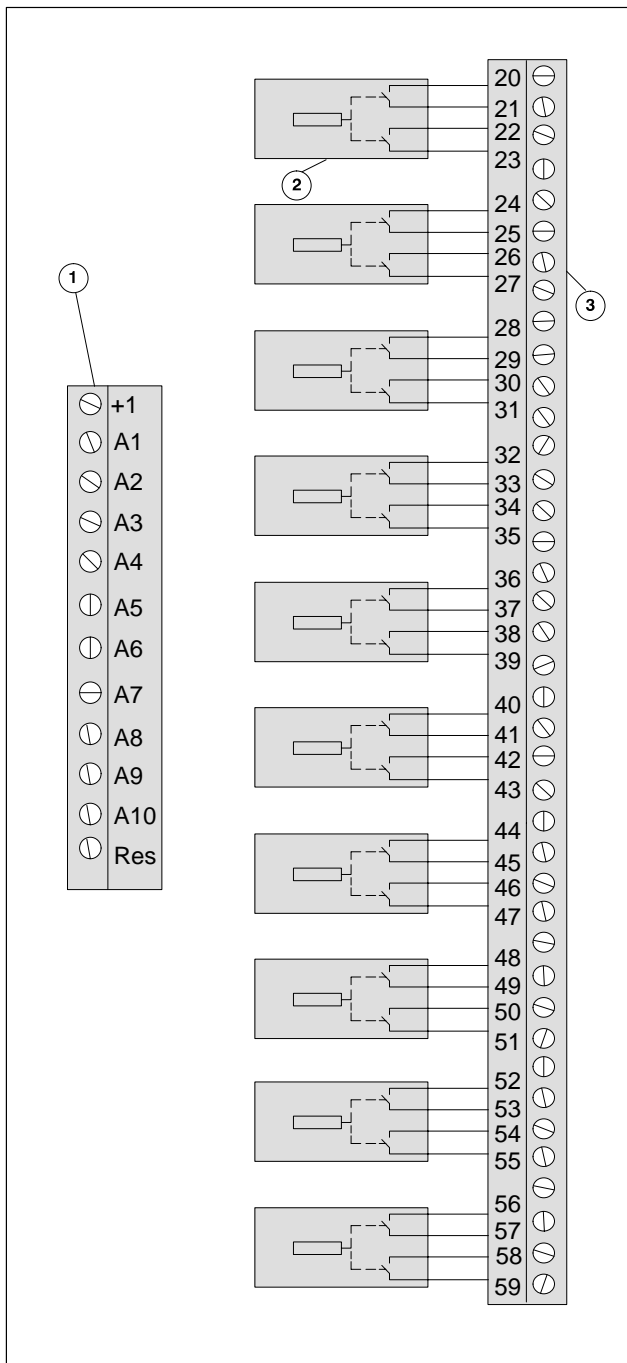
Fig. 12 Block diagram of the SAM interface output module

3.3 Connections

**Warning – Danger if the following safety instructions are not observed!**

Non-observance of the following safety instructions can lead to immediate hazards to man and/or machine.

- To ensure an undisturbed function of the press control system, the additional equipment that is to be connected must contain adequate interference suppression measures.
- For safety reasons, the signals "radiators ON/OFF" and "paper in printing unit 1 at production" must be linked appropriately with the signal "operation" by the dryer manufacturer.
- Safety reasons do not allow washup devices and UV dryers to be used simultaneously on the printing press.
- Likewise, the system must manually be halted for an adequate waiting time in order to allow all vapours to escape.



- ① Terminal strip: SAM-X1;
Connections to the central control box ZSG
- ② Relays
- ③ Terminal strip: SAM-X2;
Connections of the auxiliary equipment

The cables of the auxiliary equipment are connected to the SAM-X2 terminal strip of the SAM interface output module.

Fig. 13 SAM interface output module

Connection to terminal	Auxiliary equipment
20 and 21	Run
22 and 23	Run
24 and 25	Dryer ON/OFF (e.g. IR dryer or UV dryer)
26 and 27	Dryer ON/OFF (e.g. IR dryer or UV dryer)
28 and 29	Radiator ON/OFF (e.g. IR dryer or UV dryer)
30 and 31	Radiator ON/OFF (e.g. IR dryer or UV dryer)
32 and 33	Paper in printing unit 1 at production (e.g.: UV dryer)

Connection to terminal	Auxiliary equipment
34 and 35	Paper in printing unit 1 at production (e.g.: UV dryer)
36 and 37	–
38 and 39	–
40 and 41	Printed sheets in the delivery (e.g.: tape inserter) Streifeneinleger)
42 and 43	Printed sheets in the delivery (e.g.: tape inserter) Streifeneinleger)
44 and 45	Feeder ON/OFF (e.g. HSQ)
46 and 47	Feeder ON/OFF (e.g. HSQ)
48 and 49	Powder spray unit ON/OFF
50 and 51	Powder spray unit ON/OFF
52 and 53	Reserve
54 and 55	Reserve
56 and 57	Main drive emergency stop
58 and 59	Main drive emergency stop

Tab. 4 SAM interface output module

**Note**

Maximum contact rating: AC 230 V/1 A

3.4 Output signals at the SAM



Warning – Danger if the following safety instructions are not observed!

Non-observance of the following safety instructions can lead to immediate hazards to man and/or machine.

- In the UV dryer connection, the "Radiator ON/OFF" and "Paper in printing unit 1 during production" must be interconnected in a suitable way with the "RUN" signal.
- For reasons of safety, wash-up devices and dryers must never be operated at the same time. Before and after the washup procedure using a washup device, a waiting period of 180 seconds must always be observed for UV dryers.

Run

Control signal for all auxiliary equipment.

The signal is applied when the printing press is „running“ (the press runs at the minimum speed of 3000 pr/h).

Dryer/OFF

Control signal, e.g. for IR and UV dryer. The signal becomes active when

- the dryer has been preselected on the control console and if the following guards are closed: cylinder guards between the printing units and printing unit/delivery protection grids;
- there is still paper in the press after a press stop and the printing press goes back to "operation".

The signal is switched off when

- an emergency stop function is activated;

With press standstill, only by emergency stop switch „Emergency stop“; cylinder guard between the printing units and printing unit/delivery protection grid.

- an automatic washup procedure is initiated;
- there is still paper in the press in the case of a press standstill (not with UV dryer with shutter);
- the gripper bars in the delivery are in the irradiation range of the UV dryer for more than 1 minute (only with UV dryer without shutter);
- the 180-second period has not yet elapsed after an overall initialization.

Radiator ON/OFF

Control signal, e.g. for IR and UV dryer.

The signal is active when printed sheets pass the dryer section in the delivery.

The signal is switched off when an emergency stop function is activated during production. When "operation" is restarted, the signal is present again until all sheets have been transported to the delivery.

The "dryer ON/OFF" function in the actual value display permits the signal to be activated and deactivated.

Paper in printing unit 1 during production

Control signal, e.g. for inter-unit dryer. The signal is present when the sheets pass the first printing unit during "production".

Emergency stop (of printing presses)

Control signal for the additional equipment which should be shut off when the "emergency stop switch" has been actuated on the printing press.

The signal is present as long as no "emergency stop switch" has been actuated.

Printed sheets in the delivery

Control signal, e.g. for tape inserter.

Prerequisite:

The job counter is switched on.

The signal is activated when printed sheets reach the delivery.

Feeder ON/OFF

Control signal, e.g. for sheeter.

The control signal is active as long as the feeder is engaged.

Powder spray device ON

Control signal for external powder spray devices.

Prerequisite:

The powder spray device has been preselected at the control console.

The signal is active as long as printed sheets leave the last printing unit and reach the delivery.

Main drive emergency stop

Additional (redundant) control signal for additional equipment which is to be shut off in case of an "emergency stop" of the printing press.

The signal is present as long as the press control system does not enable the "emergency stop" signal to the main drive.

4 Single-Fault Fail-Safe Extension Module EEM

4.1 Task and Function

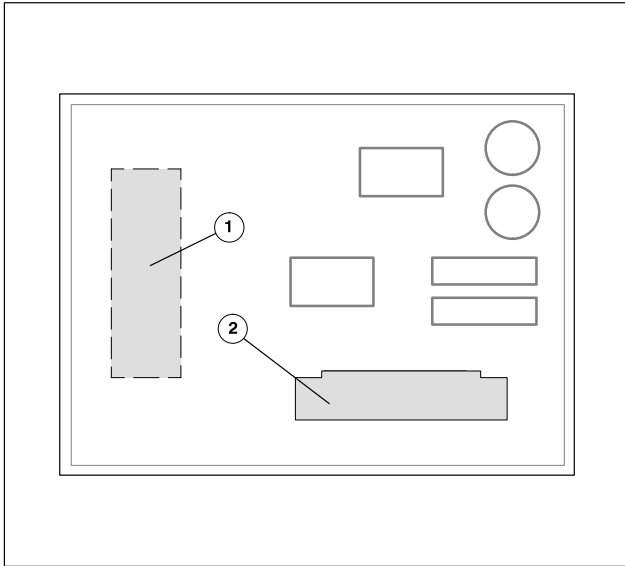


Fig. 14 Single-fault fail-safe extension module EEM

- ① Connector X1;
Connection to the computer back panel RER2
- ② Connector X2;
Ground and connection to the SAM

In an isolated and open-circuit-monitored way, the EEM switches the "main drive emergency stop" signal from the REK2. This second signal transmission path (as opposed to the signal "emergency stop" via EAK to SAM) ensures a single-fault fail-safe structure.

In the event of an open circuit or when the "main drive emergency stop" signal from an SEK is active, the corresponding relay on the SAM trips.

4.2 Block Diagram

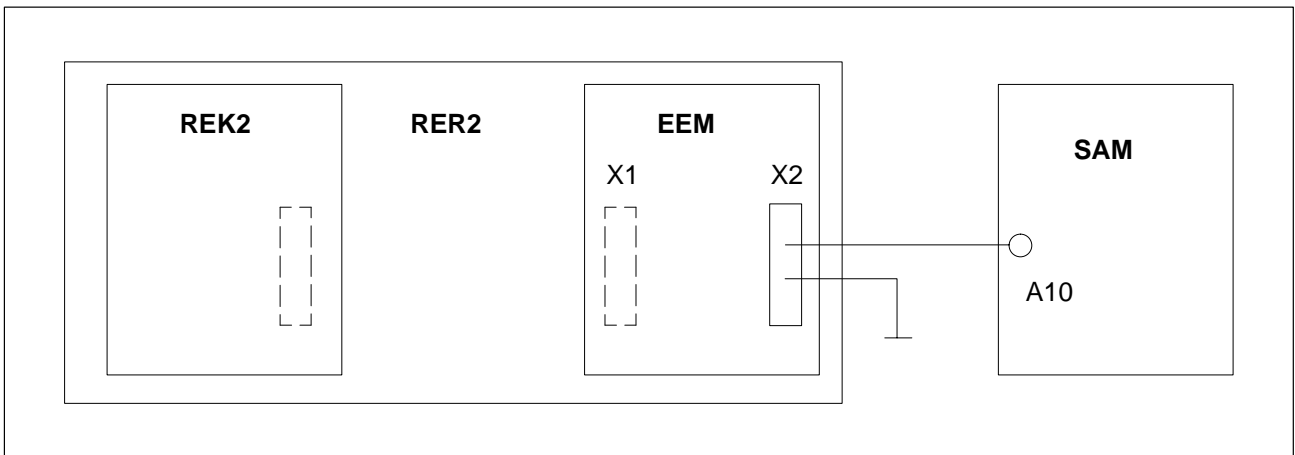
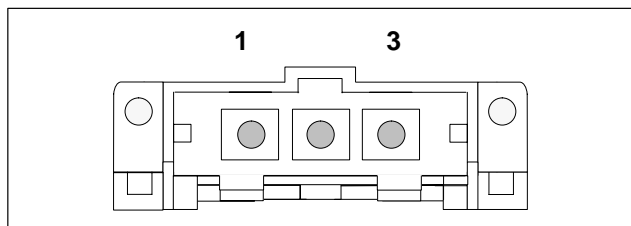


Fig. 15 Block diagram EEM

4.3 Connector



GR SG9046212000000000

Fig. 16 Connector X2

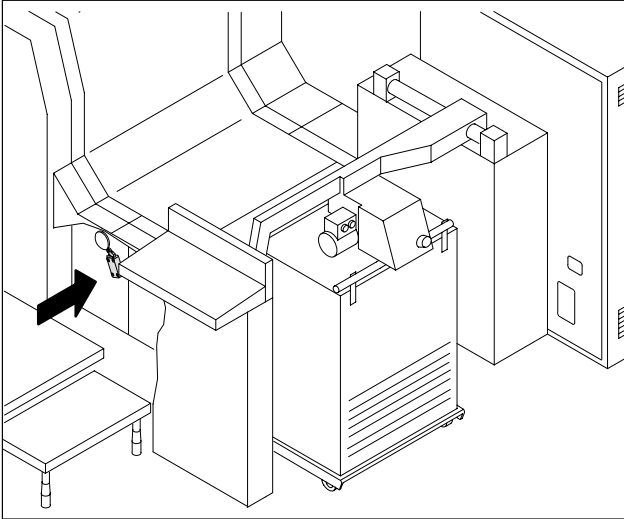
Pin	Function
1	Connection to earth (when using two SEKs for > 8 PUs, otherwise not connected)
2	Connection to earth (when using one SEK for <= 8 PUs, otherwise not connected)
3	Relay when emergency stop/non-emergency stop (ground) and when emergency stop high-impedance (no ground)

Tab. 5 Plug connector X2

5 Press cycle position switch 1S65

5.1 Installation location

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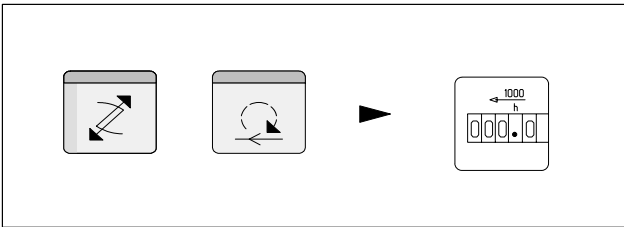


GR MS9045215000000000

The "press cycle" position switch 1S65 is located before the first printing unit at the operator's side O.S.

Fig. 17 Place of installation of the position switch 1S65

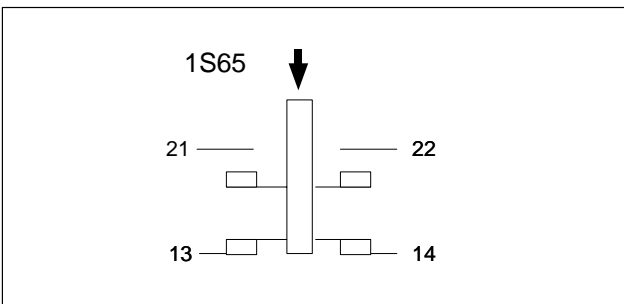
5.2 Installation and removal



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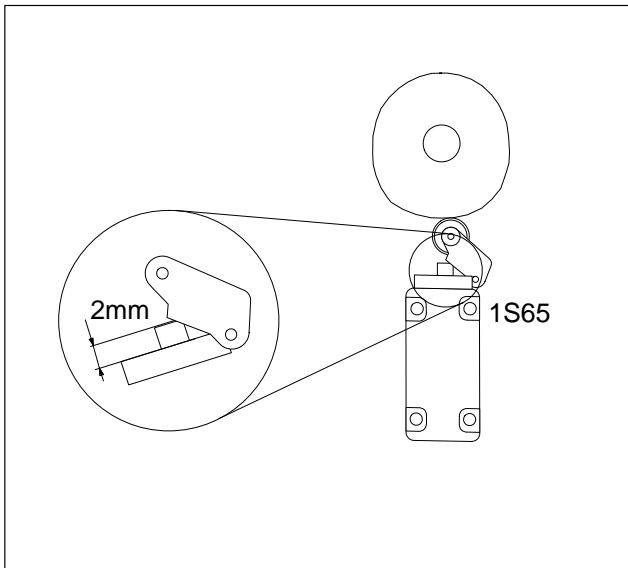
- 1 Position the printing press to a press angle of $000.0^\circ \pm 4^\circ$.
- 2 Switch off the main switch 15Q66.
- 3 Remove the defective position switch 1S65. Install the new position switch 1S65.
- 4 When you install the position switch, align it such that the NC and NO contacts are actuated.

Fig. 18 Positioning



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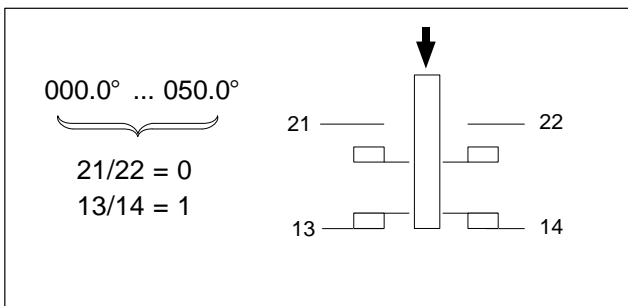
Fig. 19 Contacts of the position switch 1S65



GR M5904521800000000

- 5 Adjust the position switch such that the remaining actuator travel (to the stop of the position switch) is 2 mm when the switch is actuated.
- 6 Tighten the fixing bolts of the position switch.

Fig. 20 Adjustment of the position switch



GR M5904521900000000

- 7 Switch on the main switch 15Q66.
- 8 Check in inching mode whether both contacts of the position switch 1S65 are actuated for the duration of 000.0° ... 050.0° (display on the MID).

Fig. 21 Contacts of the position switch 1S65

Appendix

1	Physical Dimensions, Their Units and Conversion	A.7.3
1.1	Physical Dimensions, Their Units and Conversion	A.7.3
2	Particular Conversions and Multiples	A.7.4
2.1	Particular Conversions and Multiples	A.7.4
3	Water Hardness	A.7.5
3.1	Water Hardness	A.7.5
4	Conversion of Fractions into Decimals	A.7.6
4.1	Conversion of Fractions into Decimals	A.7.6

1 Physical Dimensions, Their Units and Conversion

1.1 Physical Dimensions, Their Units and Conversion

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Quantity	Measuring unit and conversion			
	SI system	ANSI system	ANSI system	SI system
Length	1 mm	0.03937 in	1 in	25.4001 mm
	1 cm	0.3937 in	1 in	2.54001 cm
	1 m	3.28084 ft	1 ft	0.30480 m
Surface	1 mm ²	0.00155 sq in	1 sq in	645.16129 mm ²
	1 cm ²	0.15500 sq in	1 sq in	6.45162 cm ²
	1 m ²	10.7639 sq ft	1 sq ft	0.09290 m ²
Volume	1 cm ³	0.06102 cu in	1 cu in	16.38706 cm ³
	1 dm ³	61.02376 cu in	1 cu in	0.01639 dm ³
	1 m ³	35.31466 cu ft	1 cu ft	0.02832 m ³
Speed	1 m/s	3.28084 ft ps	1 ft ps	0.3048 m/s
	1 m/min	3.28084 ft pm	1 ft pm	0.3048 m/min
Volume flow rate	1 dm ³ /min	61.0238 cu in/min	1 cu in/min	0.01639 dm ³ /min
	1 dm ³ /h	61.0238 cu in/h	1 cu in/h	0.01639 dm ³ /h
	1 m ³ /h	35.31466 cu ft/h	1 cu ft/h	0.02832 m ³ /h
Mass	1 kg	2.20462 lbs	1 lbs	0.45359 kg
Density	1 kg/dm ³	0.03613 lbs/cu in	1 lbs/cu in	27.6796 kg/dm ³
	1 kg/m ³	0.06243 lbs/cu ft	1 lbs/cu ft	16.01846 kg/m ³
Force	1 N	0.22481 lbf	1 lbf	4.44822 N
Pressure/surface tension	1 bar	14.5038 psi	1 psi	0.06895 bar
	1 N/mm ²	145.038 lbf/sq in	1 lbf/sq in	0.00689 N/mm ²
	1 N/cm ²	1.45038 lbf/sq in	1 lbf/sq in	0.68948 N/cm ²
	1 N/m ²	0.02089 lbf/sq ft	1 lbf/sq ft	47.879 N/m ²
	1 kg/m ²	0.20482 lbf/sq ft	1 lbf/sq ft	4.88233 kg/m ²
Power	1 kW	1.34102 hp	1 hp	0.74570 kW
Illuminance	1 lx	10.7640 fc	1 fc	0.09290 lx

Tab. 1 Physical dimensions, their units and conversion

2 Particular Conversions and Multiples

2.1 Particular Conversions and Multiples

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Conversion for units of length

$$1 \text{ ft} = 12 \text{ in}$$

$$1 \text{ yard} = 3 \text{ ft} = 36 \text{ in}$$

Conversion for units of volume

$$1 \text{ litre} = 1 \text{ dm}^3$$

$$1 \text{ litre} = 0.26417 \text{ US gal}$$

$$1 \text{ litre} = 0.21997 \text{ UK gal}$$

$$1 \text{ US gal} = 231.0 \text{ cu in} = 3.785 \text{ dm}^3$$

$$1 \text{ UK gal} = 277.4 \text{ cu in} = 4.546 \text{ dm}^3$$

$$1 \text{ cu ft} = 1728 \text{ cu in}$$

Conversion for units of mass

$$1 \text{ lbs} = 16 \text{ oz (avoirdupois)} = 453.6 \text{ g}$$

$$1 \text{ oz (avoirdupois)} = 28.35 \text{ g}$$

Conversion for units of pressure

$$1 \text{ bar} = 10 \text{ N/cm}^2$$

$$1 \text{ Pa} = 1 \text{ N/m}^2$$

Conversion for units of temperature

Conversion °Celsius to °Fahrenheit:

$$1.8 \times n \text{ °C} + 32$$

Conversion °Fahrenheit to °Celsius:

$$(n \text{ °F} - 32) / 1.8$$

Conversion for units of energy

$$1 \text{ W} = 3.413 \text{ Btu/h (British thermal units per hour)}$$

$$1 \text{ kW} = 3413 \text{ Btu/h}$$

$$1 \text{ kW} = 0.94806 \text{ Btu/s}$$

(British thermal units per second)

$$1 \text{ Btu/h} = 0.29307 \text{ W}$$

$$1 \text{ Btu/s} = 1.05506 \text{ kW}$$

3 Water Hardness

3.1 Water Hardness

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The water hardness is a criterion for water quality. It is defined by the content of calcium ions and magnesium ions in the water.

In Germany it is normally specified in "°dH" (degrees German hardness). Internationally, the water hardness is specified as a substance concentration in "mmol/l" (millimol per litre).

1 °dH corresponds to a calcium oxide content (CaO) of 10 mg/l (corresponding to 0.178 mmol/l).

The following table gives an overview of the various hardness grades:

Type of water	Hardness grade	Hardness [°dH]	CaO-content [mg/l]
soft	I	0 ... 7.9	0 ... 79
medium-hard	II	8 ... 14.9	80 ... 149
hard	III	15 ... 21.9	150 ... 219
very hard	IV	22 ... 27.9	220 ... 279
		28 ... 34.9	280 ... 349
		35 ... 40	350 ... 400

Tab. 2 Water hardness

Conversion of units of water hardness

German water hardness:

1 °dH corresponds to 10 mg CaO per litre of water

American water hardness:

1 °aH corresponds to 1 grain per US gal
(1 grain = 0.0648 g CaO)

English water hardness:

1 °eH corresponds to 1 grain per UK gal
(1 grain = 0.0648 g CaO)

French water hardness:

1 °fH corresponds to 10 mg CaCO₃ per litre of water

Correspondence				
Unit	°dH	°aH	°eH	°fH
Factor	1	1.04	1.25	1.79

Tab. 3 Correspondence

4 Conversion of Fractions into Decimals

4.1 Conversion of Fractions into Decimals

Conversion of linear values from <i>Fraction [in]</i>	into	
	<i>Decimal [in]</i>	<i>Decimal [mm]</i>
$1/64$	0.0156	0.3969
$1/32$	0.0313	0.7938
$3/64$	0.0469	1.1906
$1/16$	0.0625	1.5875
$5/64$	0.0781	1.9844
$3/32$	0.0938	2.3813
$7/64$	0.1094	2.7781
$1/8$	0.1250	3.1750
$9/64$	0.1406	3.5719
$5/32$	0.1563	3.9688
$11/64$	0.1719	4.3656
$3/16$	0.1875	4.7625
$13/64$	0.2031	5.1594
$7/32$	0.2188	5.5563
$15/64$	0.2344	5.9531
$1/4$	0.2500	6.3500
$17/64$	0.2656	6.7469
$9/32$	0.2813	7.1438
$19/64$	0.2969	7.5406
$5/16$	0.3125	7.9375
$21/64$	0.3281	8.3344
$11/32$	0.3438	8.7313
$23/64$	0.3594	9.1281
$3/8$	0.3750	9.5250
$25/64$	0.3906	9.9219
$13/32$	0.4063	10.3188
$27/64$	0.4219	10.7156
$7/16$	0.4375	11.1125
$29/64$	0.4531	11.5094
$15/32$	0.4688	11.9063
$31/64$	0.4844	12.3031
$1/2$	0.5000	12.7000

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Conversion of linear values from <i>Fraction [in]</i>	into	
	<i>Decimal [in]</i>	<i>Decimal [mm]</i>
$\frac{33}{64}$	0.5156	13.0969
$\frac{17}{32}$	0.5313	13.4938
$\frac{35}{64}$	0.5469	13.8906
$\frac{9}{16}$	0.5625	14.2875
$\frac{37}{64}$	0.5781	14.6844
$\frac{19}{32}$	0.5938	15.0813
$\frac{39}{64}$	0.6094	15.4781
$\frac{5}{8}$	0.6250	15.8750
$\frac{41}{64}$	0.6406	16.2719
$\frac{21}{32}$	0.6563	16.6688
$\frac{43}{64}$	0.6719	17.0656
$\frac{11}{16}$	0.6875	17.4625
$\frac{45}{64}$	0.7031	17.8594
$\frac{23}{32}$	0.7188	18.2563
$\frac{47}{64}$	0.7344	18.6531
$\frac{3}{4}$	0.7500	19.0500
$\frac{49}{64}$	0.7656	19.4469
$\frac{25}{32}$	0.7813	19.8438
$\frac{51}{64}$	0.7969	20.2406
$\frac{13}{16}$	0.8125	20.6375
$\frac{53}{64}$	0.8281	21.0344
$\frac{27}{32}$	0.8438	21.4313
$\frac{55}{64}$	0.8594	21.8281
$\frac{7}{8}$	0.8750	22.2250
$\frac{57}{64}$	0.8906	22.6219
$\frac{29}{32}$	0.9063	23.0188
$\frac{59}{64}$	0.9219	23.4156
$\frac{15}{16}$	0.9375	23.8125
$\frac{61}{64}$	0.9531	24.2094
$\frac{31}{32}$	0.9688	24.6063
$\frac{63}{64}$	0.9844	25.0031
1	1.0000	25.4000

Tab. 4 Conversion of fractions into decimals

B Index**A**

Annex, *A.7.3*

C

Chemicals, *A.1.11*

Conversion

- for units of energy, *A.7.4*
- for units of length, *A.7.4*
- for units of mass, *A.7.4*
- for units of pressure, *A.7.4*
- for units of temperature, *A.7.4*
- for units of volume, *A.7.4*
- of fractions into decimals, *A.7.6*
- of units of water hardness, *A.7.5*
- physical, *A.7.4*

Conversion table

- for units, *A.7.3*

CP2000 Center

- Installation, *A.5.3*

D

Delivery and installation

- Attachment and installation of outside devices, *A.1.9*
- Installation and modifications, *A.1.8*
- Intermediate storage, *A.1.8*
- Unloading and transport, *A.1.7*

Dismantling, *A.1.15*

Documentation, *A.1.10*

E

Electrical equipment

- Location of the rating plates, *A.4.4*
- Rating plate of the central control box, *A.4.4*
- Rating plate of the electrical equipment, *A.4.4*

Electrical installation

- Connection to the power supply network, *A.4.13*
- Electrical equipment, *A.4.3*
- Instructions and notes, *A.4.5*
- Prinect peripheral equipment, *A.5.4*
- Warning, *A.4.3*

Electronic interface, *A.6.3*

Exhaust air, *A.5.8*

External supply units, *A.5.8*

H

Handling of the press

- Delivery and installation, *A.1.7*
- Dismantling, *A.1.15*
- Operation, *A.1.9*
- Warning, *A.1.7*

I

Installation

- CP2000 Center, *A.5.3*
- Prinect peripheral equipment, *A.5.3*
- Printing press, *A.4.3*
- Supply units, *A.5.8*

Instruction

- Verification, *A.4.11*

Instructions

- Cables, *A.4.9*
- EMC measures, *A.4.6*
- Fuse protection and protection measures, *A.4.6*
- Installation, *A.4.10*
- Kind of required power supply, *A.4.5*
- Mains tolerances, *A.4.8*
- Planning, *A.4.5*

Interface adapter, *A.6.3*

- Block diagram, *A.6.5*
- Connector, *A.6.8, A.6.7*
- Installation location, *A.6.6*
- Structure and task, *A.6.3*

Interface input module, *A.6.9*

- Block diagram, *A.6.9*
- Connections, *A.6.10*
- Input signals, *A.6.11*
- Structure and task, *A.6.9*

Interface output module, *A.6.13*

- Block diagram, *A.6.14*
- Connections, *A.6.14*
- Output signals, *A.6.16*
- Structure and task, *A.6.13*

Interruption of operation, *A.1.14*

M

Mains connection

- Connection terminals, *A.4.17*
- General information, *A.4.13*
- Installation, *A.4.16*
- Instructions, *A.4.5*
- Notes, *A.4.11, A.4.14*
- Preparation, *A.4.13*
- Ranges of responsibility, *A.4.14, A.5.4*
- Variants, *A.4.18*

Warning, *A.4.13*
 Maintenance, *A.1.14*
 Multiples
 physical, *A.7.4*

N

Network
 Servers, *A.3.14*
 Versions, *A.3.3*
 Notes
 Dimensioning, *A.4.11*
 Fuse protection, *A.4.12*
 Load behaviour, *A.4.12*
 Material, *A.4.11*
 Planning, *A.4.11*
 Protection measures, *A.4.12*
 Upper harmonic waves, *A.4.12*
 Notes for the user
 Handling of the press, *A.1.7*
 Warranty and liability, *A.1.16*

O

Operation, *A.1.10*
 Before start of operation, *A.1.12*
 Documentation, *A.1.10*
 During the operation, *A.1.12*
 Handling of chemicals, *A.1.11*
 Malfunction or failure of safety devices, *A.1.13*
 Operators, *A.1.10*
 Personal protection equipment, *A.1.10*
 Protective measures, *A.1.11*
 Safety devices, *A.1.10*
 Stop or interruption of operation, *A.1.14*
 Training of personnel, *A.1.10*
 Operation of the press
 Maintenance work and repair, *A.1.14*
 Operators, *A.1.10*

P

Personal protection equipment, *A.1.10*
 Pictograph
 Secondary safety instructions, *A.1.4*
 Pictographs, *A.1.3*
 Primary safety instruction, *A.1.3*
 Preparation of the location of the press
 Check list, *A.2.3*
 Structural conditions, *A.2.4*
 Supply mains and networks, *A.2.8*
 Warning note, *A.2.3*
 Preparation of the press location, *A.2.3*
 Preparing the press location
 Heidelberg Print shop planning department, *A.2.11*

Press cycle position switch, *A.6.21*
 Installation and removal, *A.6.21*
 Installation location, *A.6.21*
 Prinect peripheral equipment
 Electrical installation, *A.5.4*
 Installation, *A.5.3*
 Mains connection, *A.5.5*
 Warning, *A.5.4*
 Printing press
 Electrical installation, *A.4.3*
 Protective measures, *A.1.11*

R

Repair, *A.1.14*

S

Safety devices, *A.1.10*
 Malfunction or failure, *A.1.13*
 Safety instruction
 Third-degree note, *A.1.5*
 Safety instructions
 Primary safety instructions, *A.1.3*
 Secondary safety instructions, *A.1.4*
 Structure, *A.1.3*
 Single-fault fail-safe extension module EEM, *A.6.19*
 Block diagram, *A.6.19*
 Connector, *A.6.20*
 Task and function, *A.6.19*
 Skilled personnel
 qualified, *A.1.6*
 Stop of operations, *A.1.14*
 Structural components
 Wall and door openings, *A.2.5*
 Structural conditions
 Arrangement of the supply networks, *A.2.5*
 Ceilings, floors and flooring materials, *A.2.4*
 Escape and rescue facilities, *A.2.6*
 Floor space and room heights required, *A.2.4*
 Foundations, *A.2.5*
 Lighting, *A.2.7*
 Ventilation and air conditioning, *A.2.6*
 Vibration and noise silencing, *A.2.8*
 Supply mains and networks
 Power supply and mains connection, *A.2.8*
 Suction and blast air, *A.2.10*
 Supply and treatment of compressed air, *A.2.9*
 Water supply and treatment, *A.2.9*
 Supply units
 Installation, *A.5.8*

T

Technical information

Basics, *A.1.3*
Construction and installation work, *A.1.5*
Definition of qualified personnel, *A.1.6*
Safety instructions, *A.1.3*
Training, *A.1.10*

U

Units
Conversion table, *A.7.3*

V

Verifications, *A.1.12*

W

Warranty and liability
Conditions and exclusions, *A.1.17*
Correct use, *A.1.16*
What to do, if...?, *A.1.17*
Water hardness, *A.7.5*
Division into hardness grades, *A.7.5*
Water supply, *A.5.8*
Workflow
Hardware requirements, *A.3.3*