

**OPERATOR'S  
MANUAL  
H 41-3**



# **OPERATOR'S MANUAL**

## **HARLACHER H 41-3**

### **AUTOMATIC COATING MACHINE**

**MAX. FRAME SIZE ???? x ???? mm**

**SERIAL NO. 41.sample**

(version from serial no. 41.800 up)

**HARLACHER AG**

Kammistrasse 11  
CH - 3800 Interlaken  
Switzerland

Tel. ++41 (0) 33 / 827 02 10  
Fax ++41 (0) 33 / 827 02 15  
e - mail: harlacher-ag@bluewin.ch

## REGISTER

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## 1. GENERAL INFORMATION ON THE H 41-3

### 1.1 Range of application

This machine is intended for coating flat screen printing or textile printing stencils with photo-emulsion. It will coat coarse and fine mesh made of polyester, nylon or stainless steel attached with a screen tension of at least 10 N/cm to suitable printing frames of the specified sizes (see chapter 1.2, Machine data sheet).

Harlacher AG refuses any responsibility for possible damage and injury due to misuse of the coating machine!

### 1.2 Machine data sheet

Electric power (+6/-10%): standard machine	3x400V, 50/60Hz, 3,5Amp, 0,8kW 3x220V, 60Hz, 3,5Amp, 0,8kW
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with dryer for screens  
up to 2000mm width 3x400V, 50/60Hz, 11,5Amp, 2,5kW  
3x220V, 60Hz, 11,5Amp, 2,5kW

with dryer for screens  
up to 3500mm width 3x400V, 50/60Hz, 19,5Amp, 4,4kW  
3x220V, 60Hz, 19,5Amp, 4,4kW

Check rating plate on machine for individual power requirements!

Compressed air: 5 to 10 bar, 5lt/min

Colors: gray RAL 7042 and blue RAL 5017

Noise emission: below 70 dB(A)

Dimensions and weights:

<input checked="" type="checkbox"/>	Screen size WxH, MM	Machine size LxWxH, MM	Recom. space LxWxH, MM	Crate size LxWxH, MM	Machine KG	Tara KG	Gross KG
...	1000x1300	2500x1050x2200	3800x3000x2300	2450x1450x1180	340	210	550
...	1250x1300	2750x1050x2200	4000x3000x2300	2450x1450x1180	350	210	560
...	1250x1700	2750x1050x2600	4000x3000x2700	2850x1450x1180	375	230	605
...	1500x1700	3000x1050x2600	4300x3000x2700	2850x1450x1180	385	230	615
...	1500x2100	3000x1050x3000	4300x3000x3100	3250x1450x1180	420	255	675
...	1750x2100	3250x1050x3000	4500x3000x3100	3250x1450x1180	430	255	685
...	1750x2500	3250x1050x3400	4500x3000x3500	3650x1450x1180	465	290	755
...	2000x2500	3500x1050x3400	4800x3000x3500	3650x1450x1180	475	290	765
...	2000x2900	3500x1050x3800	4800x3000x3900	4050x1450x1180	500	310	810
...	2250x2900	3750x1050x3800	5000x3000x3900	4050x1450x1180	510	310	820
...	2250x3300	3750x1050x4200	5000x3000x4300	4450x1450x1180	545	335	880
...	2500x3300	4000x1050x4200	5300x3000x4300	4450x1450x1180	555	335	890
...	2500x3700	4000x1050x4600	5300x3000x4700	4850x1450x1180	590	355	945
...	2750x3700	4250x1050x4600	5500x3000x4700	4850x1450x1180	600	355	955
...	2750x4100	4250x1050x5000	5500x3000x5100	5250x1450x1180	610	390	1000
...	3000x4100	4500x1050x5000	5800x3000x5100	5250x1450x1180	645	390	1035
...	.....	.....	.....	.....	.....	.....	.....

Instruction for calculating the coating trough profile lengths:

The standard profile lengths are to be calculated according to the undermentioned list. There are coating trough end pieces of different colors, i.e. red ones for the front and black ones for the back. A black coating trough is always 4/5" (20mm) shorter than a red one.

Frame width A (inside dimension)	4" - 20" 100-500mm	21 - 40" 501-1000mm	41 - 80" 1001-2000mm	above 81" above 2001mm
Trough length front (red)	A - 1 1/2" A - 40mm	A - 2" A - 50mm	A - 2 3/4" A - 70mm	A - 4" A - 100mm
Trough length back (black)	A - 2 1/3" A - 60mm	A - 2 3/4" A - 70mm	A - 3 1/2" A - 90mm	A - 4 3/4" A - 120mm

## 2. SAFETY INSTRUCTIONS

### 2.1 Introduction

All Harlacher equipment is designed for maximum safety of personnel, machine and material. It is in conformity with the provisions of the significant directives and standards.

This machine is determined for industrial use and must be operated by trained staff only. This Operator's Manual, especially its safety instructions and danger signs, must be obeyed at all times.

### 2.2 Warnings and danger signs



#### **DIRECTIONS**

**Information about technical requirements. Disobeying directions may lead to machine failures or loss of material**



#### **CAUTION**

**Points of danger which may lead to damage of the machine and / or light to medium injuries**



#### **WARNING**

**Points of danger which may lead to serious injuries and / or permanent physical damages**

### 3. INSTALLATION AND COMMISSIONING TESTS

#### 3.1 Location

The location of the machine should be determined according to the following aspects:

- room without direct daylight or with covered windows,
- yellow light,
- hard, vibration-free floor,
- short distance for taking the coated screens to the oven,
- dust-free environment, constant room temperature and humidity.

The required space depends on the machine size:

- The space between the back of the machine and the wall must be of at least 30cm, for machines with auxillary equipment of at least 70cm.
- On the left-hand-side (control panel) there must be at least 50cm, on the right-hand-side at least 30cm space. Machines equipped with lateral frame loading (option) must have additional space of at least the width of the largest screen frame on the loading/unloading side.
- On height there must be at least 20cm space between machine and ceiling for the erection of the machine.
- In front of the machine there should be at least 150cm space for screen handling and machine operation. In case of very large screens, the required space has to be determined considering all local circumstances.

#### 3.2 Transportation and unpacking



**CAUTION:** Suitable equipment must be used for lifting and transportation of the crate and heavy machine parts. See chapter 1.2, Machine data sheet, for crate size and weights.

Move the crate as close as possible to the planned location of the machine. Carefully open the top of the crate and check its contents. In case of shipping damages, immediately stop unpacking and contact the onforwarder or the shipping insurance company for further instructions.

Remove the front panel of the crate in order to have better access for unpacking heavy parts. Unwrap all parts and check the contents with the packing list of the shipping documents. Report missing parts at once to Harlacher AG.

#### 3.3 Installation and dismounting

### 3. INSTALLATION AND COMMISSIONING TESTS

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- yellow light,
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Remove the front panel of the crate in order to have better access for unpacking heavy parts. Unwrap all parts and check the contents with the packing list of the shipping documents. Report missing parts at once to Harlacher AG.

#### 3.3 Installation and dismantling





**CAUTION:** Suitable equipment must be used for handling of heavy machine parts. Secure columns (1/2) after erection to prevent them from tipping over until the connecting tubes (3/4) are mounted.

If the machine is delivered in sub-assemblies, final assembly should be mounted in the following sequence (points 1 to 12 do not apply to machines supplied fully assembled):

1. Set up control column (1) carefully and align it.
2. Attach drive shaft (5) and lower connecting tube (3) to the control column (1). Observe numbering on flanges of connecting tubes and columns for correct location. Use special screws with blue retension section for drive shaft. Do not yet tighten these screws.
3. Set up and align side column (2). Join side console and drive shaft (5) slowly. Fix all remaining connecting tubes (4) according to their (marked) numbers. Tighten all screws, also the special screws of the drive shaft.
4. Set in and fix lower frame holding beam (6) with frame holders (28).
5. Remove shipping protection on both columns from coating carriage bearing plate (14).
6. Position coating carriage (7) between bearing plates (14) and screw tight. Ensure that cable conduit (15) comes to rest on control console side. Only M6x10mm screws must be used for coating carriage on bearing plates!
7. Level machine with its 6 levelling feet. Set water level on to coating trough carrier (17) and bearing plate (14).
8. Set upper frame holding beam (8) with frame holders (27) from the back on to front guide rail (18) inbetween control column and side column, dismantle front bearing plate (19) before. Make sure to set frame holding beam exactly parallel to lower frame holders (6). For this reason rest upper beam on two identical spacer blocks on to bearing plates (14) of coating carriage (7). Re-fit bearing plates (19) and adjust for 0.1-0.3mm play by using eccentric key supplied with each machine. Connect side plate and toothed belt on the left side. Attach magnet rod (26) and adjust for 2-3mm distance to magnetic switches. Adjust lower frame holders (28) by moving holding beam (6) in such way, that a screen will be parallel to guide rails (18).
9. Fix control box (9) to control column (1), after inserting all cables and tubes into cable duct (23).
10. Insert all tubes and cables from cable conduit (15) of coating carriage (7) into cable duct (13). Connect all tubes and cables inside control column (1) according to their numbers marked on the flanges.
11. Set endpiece of cable conduit (15) into cable duct (13) and fix with cover flange.
12. For machines with optional warm air drying unit:
  - Set supporting beam (10) on to rear guide rails (analog point 8), whereby end piece (24) must be connected to toothed belt in front, right side.
  - Fix drying unit (11) on supporting beam (10). Insert cables into cable duct (12) on side column (2) and attach cable conduit (16) with cover flange. Connect cables inside side column according to their numbers.
  - Pull motor cable and dryer cable from control column (1) trough connecting tube (4) to side column (2) and connect them to terminal blocks according to their numbers.
13. Exchange plug screws with vent screws on gear motors of coating carriage in control column (1) and of drying unit in side column (2).

14. Connect pneumatic tubes (22 and 25) for upper and lower frame holders (27 and 28) and plug the cable of foot switch unit (29) into socket on control column.
15. Machines for screen height 300cm or more must be secured from upper connecting tubes (4) to wall by supplied fixations.

Dismounting of the machine is to be done in reverse order. Make sure to have the power supply disconnected before starting!

### 3.4 Power supply

#### 3.4.1 Current supply



**WARNING:** The current supply must be connected to the machine by a licenced electrician according to the diagram supplied with the machine.

Install the current supply (30) of sufficient power according to the diagram and the rating plate on the machine.

#### 3.4.2 Compressed air supply



**CAUTION:** Shut off the air supply pipeline and release the pressure in the system before starting, unless the pipeline is equipped with automatically locking quick fittings. Be aware that the electric main switch of the coating machine does not shut off the air pressure! Therefore, always disconnect the air supply (31) before working on the pneumatic system of the machine.

Install the compressed air supply (31) with 5 bar minimum pressure. A water collector (33) and a pressure control switch are installed in the control column (1).

### 3.5 Performance check



**CAUTION:** All micro switches of the machine have been adjusted prior to shipment. However, for safety reasons the correct function of these switches must be checked as follows before preparation for coating.

Check the switch functions for the following positions carefully by short movements of the carriages (see chapter 5, DIRECT FUNCTIONS):

- Coating carriage (7), lower switching point (area 50, on micro switch) and upper switching point (area 51, on magnet rod 26).
- Upper frame holding beam (8), upper switching point (area 52, on micro switch), no lower switching point (mechanical free-wheel).
- Drying unit (10/11), upper switching point (area 52, on micro switch) and lower switching point (area 53, on micro switch).

If necessary, adjust these switches for proper function.

The remaining magnetic switches can be checked in the automatic program mode only (see chapter 10, DESCRIPTION OF THE PROGRAMS). Check the distance between magnets and switches first, it must be of 2-3mm. Then, run a program for test purpose with no coating troughs (34) and no screen in the machine.

Check all pneumatic movements individually (see chapter 6, MANUAL FUNCTIONS). Chapter 12, INSTRUCTIONS FOR MAINTENANCE, contains more information on the adjustment of the pneumatic movements.

Check the optional drying unit (11) for even air flow all over its width. Adjust the air flow with the outlet slides (32) if necessary.

#### 4. SETTING-UP AND PREPARATION



**CAUTION:** Correct adaptation of the machine to the actual screen size is essential for good coating results and in order to avoid damage on material and machine.  
Make sure to use suitable equipment to handle large or heavy screens.

Before coating a screen, the machine has to be adapted to the respective screen size as follows:

- Upper and lower frame holders (27 and 28) have to be adjusted to the respective width of the screen and the side stopper on the right has to be positioned so that the screen is exactly in the middle of the machine.
- Measuring of the screen frame profile and adjustment of the coating distance on the upper and lower side. The adjusting devices (54 and 55) are located on the control column (1).



**DIRECTION:** When choosing the distance too small, the front coating trough (34) collides with the screen frame and might get damaged.  
Always set the screens with their mesh side (print side) towards the back into the machine!

- Select a suitable pair of coating troughs (34) and fix them. The red coating trough has always to be installed in the front and the black coating trough in the back. See chapter 1.2, Machine data sheet, for correct coating trough lengths. Always remove the black edge protection profile before coating and apply it to the coating troughs when they are not used.
- Fill the coating troughs with a sufficient amount of emulsion. The maximum content of the coating troughs is 1 liter for 1 meter length. For best coating results, refer to the product data sheet of the emulsion supplier.
- Fill the watertank(s) for the coating trough edge cleaning system half-way up with water, in case this option is attached.

#### 5. DIRECT FUNCTIONS



**CAUTION:** All keys, which release movements directly, are basically controlled against operating errors. The integrated LED is on, only when they are free for use. Additionally, the coating carriage drive motor is equipped with a safety clutch for protection in case of a collision.

However, it is essential to check for free travel, before starting any movement and to keep out of the dangerous area (marked with yellow and black stripes) at all times.

## 5.1 Upper frame holder

### 5.1.1 Frame holder up

By pressing the key FRAME HOLDER UP (63) or when using the foot switch the frame holder (29) moves upward. This movement will only be released, when the frame holders are unlocked resp. open.

By pressing the key FRAME HOLDER UP or when using the foot switch as also the key START (66) at the same time, the frame holder moves upward - maximum up to the upper limit switch. This movement can be stopped at any time by pressing the key STOP (66).

### 5.1.2 Frame holder down

By pressing the key FRAME HOLDER DOWN or when using the foot switch, the frame holder moves downward. This movement will only be released, when the frame holders are unlocked resp. open.

By pressing the key FRAME HOLDER DOWN or when using the foot switch, the frame holder moves downward - maximum until the free-wheel responds (e.g. when inserting the screen frame). The START key can, therefore, not be used for downward movements.

## 5.2 Screen fixation



**DIRECTION:** Always set screens with their mesh side (print side) towards the back into the machine. Whenever possible, coat screens in portrait position rather than landscape position.

The upper and lower screen fixations (frame holders 27 and 28) are activated by the foot switch (29). Each switch impulse opens or locks the frame holders. The upper frame holding beam (8) can be moved only with open frame holders, while they must be locked to start a coating program.

With the option multiple coating (see chapter 7.5), there is an individual foot switch for each screen. Therefore, all frame holders must be open or locked for above mentioned actions, whether or not there is a screen.

## 5.3 Coating carriage

### 5.3.1 Coating carriage up

By pressing the key CARRIAGE UP (64), the coating carriage (7) moves upward. This movement will only be released when the upper frame holding beam (8) is not on the upper limit switch!

By pressing the keys CARRIAGE UP (64) and START (66) at the same time, the coating carriage moves automatically upward - maximum to the upper limit switch on the frame holder. This movement can be stopped at any time by pressing the key STOP (66).

#### 5.3.2 Coating carriage down

By pressing the key CARRIAGE DOWN (64) the coating carriage moves down.  
By pressing the key CARRIAGE DOWN and START at the same time, the coating carriage moves automatically downward - maximum to the lower limit switch. This movement can be stopped at any time by pressing the key STOP.

#### 5.4 Drying carriage

The drying carriage with the drying system is an option, and the keys are only activated, when this option is existing.

##### 5.4.1 Drying carriage up

By pressing the key DRYING CARRIAGE UP (65) the drying system moves upward.

By pressing the keys DRYING CARRIAGE UP and START (66) at the same time, the drying carriage moves automatically upward, maximum up to the upper limit switch. This action can be interrupted at any time by pressing the key STOP (66).

##### 5.4.2 Drying carriage down

By pressing the key DRYING CARRIAGE DOWN the drying system moves down.

By pressing the keys DRYING CARRIAGE DOWN and START, the drying carriage moves automatically downward, maximum down to the lower limit switch. This action can be interrupted at any time by pressing the key STOP.

## 6. MANUAL FUNCTIONS



**DIRECTION:** These functions can be used only if the coating carriage (7) is set in a central position. Move it up by the key COATING CARRIAGE UP (64). Make sure to avoid collisions before releasing any of the following movements. Do not set the coating carriage to its basic position before all pneumatic cylinders are fully reset.

For activating the manual functions, following inputs have to be done in the main menu (key set 62):

- F1 SET-UP MODE
- F1 MANUAL FUNCTIONS

The menu for manual functions is now open and with the keys 1 - 6 the following functions can be activated. Key F8 returns to the main menu.

#### 6.1 Pneumatic functions

All pneumatic valves can be activated and de-activated manually. The activation is done with the key START, the de-activation by key STOP.

Key co-ordination (61):

key 1	trough in / trough out squeegee side
key 2	trough in / trough out printing side
key 3	both troughs in; tilt up / set down both troughs
key 4	cylinder for trough edge cleaning forth / back (option)
key 5	motor for sponge washing on / off (option)

When working with dual edge cleaning, both cylinder resp. washing motors respond on keys 4 and 5 simultaneously.

## 6.2 Counters

The following figures, for the data collection of productivity studies and maintenance planning, can be displayed by using key 6 (61):

- counter for all "direct" coatings
- counter for all "direct/dryer" coatings (option)
- counter for all "capillary roll/sheet" applications (option)

Each counter "DEL YES/NO" will inquire whether or not the memory should be deleted. "YES" corresponds to the key "+", "NO" to any other key. If "YES" is chosen, the counter memory can only be deleted by previously entering the correct code, otherwise the present value remains unchanged (see chapter 14, INPUT CODES AND BASIC SETTINGS).

## 6.3 Contrast of display

The contrast of the text display (60) can be adapted to various light conditions. Press key "CTRL" (67) and at the same time toggle keys "+" or "-".

- 
7. OPTIONS
- ① Hold CTRL button and press F1
  - ② release CTRL button
  - ③ press F3
  - ④ hold CTRL button and press F4

Up to now, following options are available. If present, they can be activated in the menu OPTIONS. Contact Harlacher AG for special requirements which are not listed below.

To enter the menu OPTIONS from the main menu, the input of a special code is necessary (see chapter 14, INPUT CODES AND BASIC SETTINGS). Note that this code is different from the one required for coating programs.



**DIRECTION:** Changes of the factory settings must be noted and securely stored together with the machine in any case. Do not make any changes without reason, as uncorrect settings may lead to damages of the machine.

Browse in the menu with the key ENTER (69); activate points with "+" and reset an existing point with "-".

## 7.1 Languages

The language on the text display may be changed at any time without problems. The following languages are permanently available:

- German
- English
- French
- Italian
- Spanish

#### 7.2. Automatic emulsion feeding PS/SS

This device controls the emulsion in the coating troughs and fills them up automatically in case of need, if desired directly from the original container. The system can be delivered for one and/or both sides.

#### 7.3 Warm air drying system

This option consists of an additional carriage on the machine. Thereon mounted is a warm air ventilator. This ventilator allows the automatical drying of the coated screen on the machine during the program cycle (see also chapter 8.2, Installation of coating programs direct/drying). The dryer option is always installed together with the option "coating trough edge cleaning" (see chapter 7.4) in order to avoid unsatisfactory coating results due to premature emulsion drying on the edges of the coating troughs.

#### 7.4 Coating trough edge cleaning

The option coating trough edge cleaning can be delivered for one side cleaning (on squeegee or printing side) or both side cleaning (squeegee and printing side). Two systems are available.

##### Wet cleaning:

A small sponge, humidified and cleaned in the water tank, runs forth and back over the edge of the coating trough after every coating pass. This prevents drying of the emulsion on the trough edge, which may lead to uneven coatings.

##### Dry cleaning:

A simpler, but also effective version consists of a stripping system by small rubber squeegees, without wet cleaning. These squeegees have to be wiped-off manually from time to time.

#### 7.5 Multiple coating

There is the possibility of coating several screens simultaneously - one beside the other. This will multiple the productivity on all applications where many screens of few standard frame sizes have to be coated.

Each screen has its individual frame holder which is activated with a foot switch. All frame holders must be in the required position (open or locked) in order to move the upper frame holding beam or to start a coating program.

#### 7.6 Capillary film (from the roll)

Adaptation for the automatic transfer of capillary film from the roll onto the screen. The fixation is done by means of emulsion from the squeegee side.

#### 7.7 Capillary film (sheet)

Special program for the transfer of pre-cut sheets of capillary film onto the screen. The fixation is done by means of emulsion from the squeegee side.

## 7.8 Lateral frame loading

The lateral slide (from one side or straight through) considerably facilitates the operator's task when working with large frames and, as well allows to integrate the machine into an automatic production line. It therefore helps to increase the productivity in screenmaking.

## 8. INSTALLATION OF COATING PROGRAMS

The following inputs have to be done, before the different programs can be set (programmed):

- F1 SET-UP MODE
- F2 PROGRAMMING
- entry of the code (will be requested, see chapter 14)

With a correct code, the programming menu will appear. Otherwise it drops back into the installation menu.

### 8.1 Direct (wet/wet)

Press key F1 in the programming menu for programming or changing direct programs. Follow the inquiry according to the program number, which has to be confirmed after the input with the key ENTER (arrow). Up to 20 direct programs can be stored!

Now follow the menu for these parameters (browse with key ENTER):

- COATING PS: (number of coatings on the printing side)
- COATING SS: (number of coatings on the squeegee side)
- COATING SPEED: (speed of coating carriage during coating process)
- DELAY TIME START: (delay time before start of coating action until emulsion reaches mesh)

All parameters can be changed by the direct input of numbers, also by pressing the keys "+" or "-". The above mentioned parameters can be changed in the following ranges:

- COATING PS: 0 up to 99 times
- COATING SS: 0 up to 99 times
- COATING SPEED: 010 up to 950 cm/min (decadics only)
- DELAY TIME START: 1 up to 99 seconds

All entries have to be confirmed with the key ENTER. When all parameters have been set, the programming menu will re-appear and a new program may be prepared.

### 8.2 Direct/dryer

The drying unit is an option. Therefore, all direct/dryer programs are only accessible, if this option exists.

Press key F2 in the programming menu for programming or changing direct/dryer programs. Follow the inquiry according to the program number, which has to be confirmed after the input with the key ENTER (arrow). Up to 20 direct/dryer programs can be stored!

Before entering a direct/dryer program one of the following modes must be selected:

- F1 ALTRNATING
- F2 FINAL DRYING

These functions and the programming are described hereafter. An asterisk behind the respective text shows the previously stored mode of an existing program.





**DIRECTION:** By changing this mode selection, the data of an existing program may be altered involuntarily. Make sure to confirm a preselection if programs will be viewed only.

### 8.2.1 Alternating

This is the universal program for the drying unit. It allows a free choice of initial coating, initial drying, final coating, intermediate drying (inbetween each final coating!) as final drying.

Press F1 and follow the menu for these parameters (browse with key ENTER):

- INITIAL COATS PS: (number of initial coatings on printing side)
- INITIAL COATS SS: (number of initial coatings on squeegee side)
- INITIAL DRYING: (number of drying passes)
  
- COATING PS: (number of coatings on printing side)
- COATING SS: (number of coatings on squeegee side)
- INTERM DRYING: (number of drying passes inbetween each coating)
- FINAL DRYING: (number of drying passes)
  
- DELAY TIME START: (delay time before start of coating action until emulsion reaches mesh)
- COATING SPEED: (speed of coating carriage during coating process)
- DRYING SPEED: (speed of drying carriage during drying process)

All parameters can be changed by direct input of numbers and also by pressing the keys "+" or "-". The above mentioned parameters can be changed in the following ranges:

- INITIAL COATS PS: 0 up to 99 times
- INITIAL COATS SS: 0 up to 99 times
- INITIAL DRYING: 0 up to 99 times
  
- COATING PS: 0 up to 99 times
- COATING SS: 0 up to 99 times
- INTERM DRYING: 0 up to 99 times
- FINAL DRYING: 0 up to 99 times
  
- DELAY TIME START: 0 upto 99 seconds
- COATING SPEED: 010 upto 950 cm/min (decadics only)
- DRYING SPEED: 010 upto 950 cm/min (decadics only)

All entries have to be confirmed with the key ENTER. When all parameters have been set, the programming menu will reappear and a new program may be prepared.

### 8.2.2. Final drying

This is the simpler version for the using of the drying system. It offers only the possibility for coating and final drying.

Press F2 and follow the menu for these parameters (browse with key ENTER):

- COATING PS: (number of coatings on printing side)
- COATING SS: (number of coatings on squeegee side)
- FINAL DRYING: (number of drying passages)

- DELAY TIME START: (delay time before start of coating action, until emulsion reaches mesh)
- COATING SPEED: (speed of coating carriage during coating process)
- DRYING SPEED: (speed of drying carriage during drying process)

All parameters can be changed by the direct input of numbers and also by pressing the keys "+" or "-". The above mentioned parameters can be changed in the following ranges:

- COATING PS: 0 up to 99 times
- COATING SS: 0 up to 99 times
- FINAL DRYING: 0 up to 99 times
  
- DELAY TIME START: 0 upto 99 seconds
- COATING SPEED: 010 upto 950 cm/min (decadics only)
- DRYING SPEED: 010 upto 950 cm/min (decadics only)

All entries have to be confirmed by key ENTER. When all parameters have been set, the programming menu will re-appear, and a new program may be prepared.

## 9. INSTALLATION OF GENERAL PARAMETERS

General parameters are the variable parameters which are identical for all programs. To do this installation, it is necessary to enter the following inputs from the main menu:

- F1 SET-UP MODE
- F3 COMMON PARAMETERS
- entry of the code (will be requested, see chapter 14)

The following parameters will come up after a correct input of the code. Otherwise it drops back into the set-up menu!

- EDGE CLEANING: (time for sponge or squeegee to run forth and back, depending on width of machine)
- EMULSION RETURN: (delay time after coating action, until emulsion returns)
- DELAY TIME DRYER: (delay time of drying unit at its lowest position before reversing upward)

All parameters can be changed by the direct input of numbers and by pressing the keys "+" or "-". The above mentioned parameters can be changed in the following ranges:

- EDGE CLEANING: 0 up to 99 seconds
- EMULSION RETURN: 0 up to 99 seconds
- DELAY TIME DRYER: 0 up to 99 seconds



**DIRECTION:** It is possible to switch off the edge cleaning, if it is not to be used for any reason. Insert the time 00 for the edge cleaning to switch it off! Make sure not to set too long times for the edge cleaning. This would allow the coating carriage to move downward before the edge cleaning device has returned which might cause a collision.

The edge cleaning system and the dryer unit are options and will only be shown if the machine is equipped with these options!

All entries have to be confirmed by the key ENTER. When all parameters have been set, the programming menu will re-appear, and the next menu may be chosen.

## 10. DESCRIPTION OF THE PROGRAMS

### 10.1 Direct (wet/wet)

#### 10.1.1 Program start

For running a direct program, starting from the main menu, the following inputs have to be made:

- F2 AUTOMATIC MODE
- F1 DIRECT

Select the desired program number, which has to be confirmed by the key ENTER (69). Twenty direct programs can be chosen.

The selection of a not yet defined program causes an error message.

The content of an existing program will be shown in short form for a cross-check, see also chapter 10.1.2.

Before the program can be started by pressing the key START (66), the following conditions must be fulfilled:

- all frame holders locked
- coating carriage in the lowest position - on the limit switch
- upper frame holder in intermediate position - not on the upper limit switch
- with option drying unit: drying carriage in the upper position - on the limit switch
- key ENTER pressed to confirm the program number!

If not all conditions are fulfilled, the program cannot be started. The key START is not illuminated.

#### 10.1.2 Program cycles

After the key START has been pressed, the direct program runs as follows:

1. Coating carriage moves up to the lower end of the coating area
2. One or both coating troughs move towards the mesh
3. One or both coating troughs tilt upwards
4. "DELAY TIME START" runs (so that the emulsion reaches the mesh)
5. Coating action at pre-set speed
6. Coating troughs tilt back at upper end
7. Delay time "EMULSION RETURN" runs
8. Stripping of emulsion residues by short upward movement
9. Coating troughs move away from the mesh - if the option exists, the cleaning operation starts
10. Coating carriage moves down at maximum speed to the lower end of the screen
11. In case several coating passes have been programmed, step 2 starts again

12. After completing the required number of coatings, the coating carriage returns to its starting position

13. The display shows:    PROGR. F1 NO. xx IS  
                              COMPLETED!

F8 EXIT

and an acoustic signal sounds.

While the program is running, the display shows:  
                              PROGR. F1 No. xx IS IN  
                              OPERATION

PS    SS  
ZZ    ZZ

PS and SS show the actual number of coatings still to be done.

When a program is finished and the display shows the picture mentioned at step 13 - with the key START the same program can be run again or return to the automatic menu with F8, where a new program may be selected.

## 10.2 Direct/drying

### 10.2.1 Program start

The drying unit is an option, and the program direct/drying can only be used if this option exists.

For running a direct/dryer-program, starting from the main menu, the following inputs have to be made:

- F2 AUTOMATIC MODE
- F2 DIRECT DRYER

Select the desired program number, which has to be confirmed by the key ENTER (69). Twenty direct/dryer programs can be chosen.

The selection of a not yet defined program causes an error message.

The content of an existing program will be shown in short form for a cross-check, see also chapter 10.2.2.

Before the program can be started by pressing the key START (66), the following conditions must be fulfilled:

- all frame holders locked
- coating carriage in the lowest position - on the limit switch
- upper frame holder in intermediate position - not on the upper limit switch
- with option drying unit: drying carriage in the upper position - on the limit switch
- key ENTER pressed to confirm the program number!

If not all conditions are fulfilled, the program cannot be started. The key START is not illuminated.

### 10.2.2 Program cycles

Two modes are available in the direct/dryer program, alternating or final drying (see also chapter 8.2, installation of coating programs, direct/dryer).

After pressing START, the program direct/dryer, depending on the selected mode, runs as follows:

#### 10.2.2.1 Alternating

1. Coating carriage moves up to the lower screen side
2. One or both coating troughs move towards the mesh
3. One or both coating troughs tilt upwards
4. "DELAY TIME START" runs (so that emulsion reaches the mesh)
5. Coating action at the preset speed
6. Coating troughs tilt back at upper end
7. Delay time "EMULSION RETURN" runs
8. Stripping of emulsion residues by short upward movement
9. Coating troughs move back from the mesh - the edge cleaning operation starts
10. Coating carriage moves down at maximum speed to the lower end of the screen
11. If several coating passes have been programmed, step 2 starts again
12. If no initial coatings will follow, the coating carriage returns to the starting position
13. The drying carriage moves down to the upper screen edge at maximum speed, the dryer is switched on
14. Inserted number of initial drying passes run with pre-set speed
15. After the drying passes the drying carriage returns to the top with maximum speed, the dryer is switched off
16. Positioning of carriage and movement of coating troughs as by steps 1 - 4
17. Final coating with the programmed speed
18. Stopping at the upper end, waiting, stripping, edge cleaning and returning as described by steps 6 - 10
19. Programmed number of final coatings, if also intermediate dryings have been programmed, inbetween every final coating pass the number of drying passes as by steps 13 - 15
20. After the last coating pass, the coating carriage moves down to the starting position
21. Now the final drying runs as by steps 13 - 15
22. The display shows     PROGR. F2 No. xx IS  
                                  COMPLETED!  
  
                                  F8 EXIT  
  
                                  and an acoustic signal sounds.

While the program is running, the display shows:

PROGR. F2 No. xx IS IN  
OPERATION

PPS PSS PDRD PS SS DR  
ZZ ZZ ZZ ZZ ZZ ZZ

Showing the actual number of:

- PPS	number of initial coatings printing side
- PSS	number of initial coatings squeegee side
- PDR	number of initial dryings
- PS	number of final coatings printing side
- SS	number of final coatings squeegee side
- DR	number of drying passes, consisting of number of intermediate dryings plus number of final dryings

When a program is finished the above mentioned text is shown at the display and the same program can be re-started by pressing the key START, or return with key F8 into the automatic program, where another program may be selected.

#### 10.2.2.2 Final drying

1. Coating carriage moves to the lower screen side
2. One or both coating troughs move towards the mesh
3. One or both coating troughs tilt forward
4. "DELAY TIME START" runs (so that the emulsion reaches the mesh)
5. Coating action at pre-set speed
6. Coating troughs tilt back at upper end
7. Delay time "EMULSION RETURN" runs
8. Stripping of emulsion residues by short upward movement
9. Coating troughs move back from the mesh and the edge cleaning operation starts
10. Coating carriage moves down to the lower end of the screen at maximum speed
11. If several coating passes have been programmed, step 2 starts again
12. After the last coating pass, the coating carriage moves back to the starting position
13. The drying carriage moves down to the upper screen frame edge at maximum speed, the dryer switches on
14. Programmed numbers of drying passes at pre-set speed
15. After the drying passes, the drying carriage moves back to the top with maximum speed, the dryer switches off
16. The display shows:   PROGR. F2 NO. xx IS  
                                  COMPLETED!

F8 EXIT

and an acoustic signal sounds

While the program is running, the display shows:

PROGR. F2 NO. xx IS IN  
OPERATION

PS SS DR  
ZZ ZZ ZZ

and the following actual numbers are shown:

PS	number of final coatings on printing side
SS	number of final coatings on squeegee side
DR	number of final dryings

When a program is finished, the above mentioned picture is shown at the display and the same program can be re-started by pressing the key START or return with key F8 into the automatic program, where another program may be selected.

## 11. WARNINGS AND ERROR MESSAGES

Most malfunctions of the coating machine H41-3 are shown on the display in plain language for the identification of the error.

Additionally, an acoustic signal sounds on every error message. This buzzer can be switched on or off by a key (70) on the control box.



**DIRECTION:** Each error message, especially overload messages (11.1 and 11.2), must be checked out carefully. Remedy must be carried out at once in order to avoid further damage.

### 11.1 Frequency converter

The frequency converter announces all malfunctions to the processor control. This may be the case, if the converter has no input voltage (e.g. damaged fuses) or a thermal overload is determined at a motor.

The display shows:

ERROR  
FREQUENCY CONVERTER  
OVERLOAD OR  
NO POWER!

### 11.2 Protective motor switch

The following protective motor switches are integrated in the control system:

- Q1	Coating carriage
- Q2	Upper frame holder
- Q3	Drying carriage (only with option drying system)

They react on short circuit and overload of the motors. They are switched on when the key is pressed. In case of malfunctions, they are automatically active, e.g. switched off. They can also be activated manually by pressing the red key 0, respectively switched off.

If one of these protective motor switches is active, the following picture is shown on the display:

ERROR  
PROTECTIVE MOTOR  
SWITCH ACTIVATED!

### 11.3 Airpressure control

During the automatic program run the entrance pressure is controlled. If it drops below approx. 2.5 bar, optimal coating is no more guaranteed.

In this case, the machine is giving an error message before the next coating process starts. If this drop of pressure arises during a coating pass, this coating pass can be finished without any problem, as the pressure is held by a one-way valve.

This message will be shown at the display in case of a malfunction:

ERROR  
NO AIR PRESSURE!

### 11.4 Upper frame holder control

In case the coating troughs should collide with the upper edge of the screen frame and push the frame up in a way that the upper frame holder runs on its limit switch, this will be checked.

For this reason, the upper frame holder must have no contact to the upper limit switch for starting a coating program.

In case of such a collision, the following message would be shown on the display:

ERROR  
UPPER FRAME HOLDER  
HAS EXCEEDED HEIGHT:  
"STOP" TO PROCEED!

In this case, the coating troughs return into their horizontal position to avoid emulsion leaking. However, they still stay in contact with the mesh and do not swing out in order to hold the screen frame in place.

Only when pressing the key STOP, the squeegees swing out. The screen frame must be held by hand before pressing STOP!

Check and correct the frame profile setting according to chapter 4, SETTING-UP AND PREPARATION.

### 11.5 Missing input

If an "empty" program number is selected and started, the following message appears on the display:

PROGRAM xx No. xx  
HAS NO DATA STORED!

F8 EXIT



## 12. INSTRUCTIONS FOR MAINTENANCE

**DIRECTION:** Follow these instructions carefully for a long and failure-free lifespan of the coating machine. Disobedience will result in the loss of warranty coverage.

### 12.1 Cleaning and lubrication

- Daily:**
- Clean coating troughs thoroughly and put on edge protection profiles.
  - If equipped with edge cleaning system, clean sponge and water container, resp. cleaning squeegee.
- Weekly:**
- Remove emulsion residues and stains from coating carriage, cylinders and guide rails.
  - Empty water collector (33) in control column (1).
- Monthly:**
- Clean carriage guide rails and lubricate lightly with machine grease.
  - After cleaning, lubricate piston rods of pneumatic cylinders lightly with oil.

### 12.2 Checks and adjustments

- Weekly:**
- Visual check for obvious damages, loose drive belts or off-set carriages e.g. as a consequence of a collision.



**CAUTION:** Damages must be checked out and repaired immediately. In case of doubt about the consequences of a damage, report to the after sales service of Harlacher AG or to the official Harlacher representative.

## 13. DRAWINGS AND REGISTERS

### 13.1 Register to drawings

- 1 Control column
- 2 Side column
- 3 Connecting tube, drive side
- 4 Connecting tube, common
- 5 Drive shaft, hexagonal tube
- 6 Lower frame holding beam
- 7 Coating carriage
- 8 Upper frame holding beam
- 9 Control box
- 10 Supporting beam
- 11 Drying unit

- 12 Cable duct, drying unit
- 13 Cable duct, coating carriage
- 14 Bearing plate, coating carriage
- 15 Cable conduit, coating carriage
- 16 Cable, conduit, drying unit
- 17 Coating trough carrier
- 18 Guide rail, front
- 19 Bearing plate
- 20 End piece
- 21 Clamping for coating troughs
- 22 Pneumatic tube for upper frame holders
- 23 Cable duct, control box
- 24 End piece, supporting beam
- 25 Pneumatic tube for lower frame holders
- 26 Magnet rod
- 27 Upper frame holders
- 28 Lower frame holders
- 29 Foot switch unit
- 30 Current supply
- 31 Compressed air supply
- 32 Air outlet slide, drying unit
- 33 Water collector, air supply
- 34 Coating trough
  
- 50 Switching point, coating carriage low
- 51 Switching point, coating carriage high
- 52 Switching point, frame holder and dryer
- 53 Switching point, dryer low
- 54 Lower frame width adjustment
- 55 Upper frame width adjustment
  
- 60 Text display, 4 lines
- 61 Key set, numerical
- 62 Key set, function keys F1 to F8
- 63 Keys for upper frame holder up/down
- 64 Keys for coating carriage up/down
- 65 Keys for drying unit up/down
- 66 Keys for START/STOP
- 67 CTRL key
- 68 "+" (plus) and "-" (minus) keys

- 69 ← (ENTER) key
- 70 Key buzzer on/off
- 71 Coating pressure regulator, squeegee side
- 72 Pressure gauge, squeegee side
- 73 Coating pressure regulator, printing side
- 74 Pressure gauge, printing side
- 75 Emergency stop switch
- 76 Main switch

## 14. INPUT-CODES AND BASIC SETTINGS



**CAUTION:** Coating programs and basic settings are protected from unauthorized alterations by access codes. Please take this sheet out of the operators manual and store it in a safe place. The codes should be given to authorized persons only. Manipulations by unauthorized persons may cause loss of data and material!

Code for the setting or changing of coating programs and for the installation of the general parameters (will be inquired):

41 - 3 (the stroke corresponds to the minus-sign)

Code for the changing of the chosen language or options (only from the main menu):

1. CTRL and F1 simultaneously
2. F2
3. F3
4. CTRL and F4 simultaneously

This machine - Serial-No. 41.8 ... .. - was delivered with following factory-settings:

### General parameters

Edge cleaning	.....	sec.
Emulsion return	.....	sec.
Delay time dryer	.....	sec.

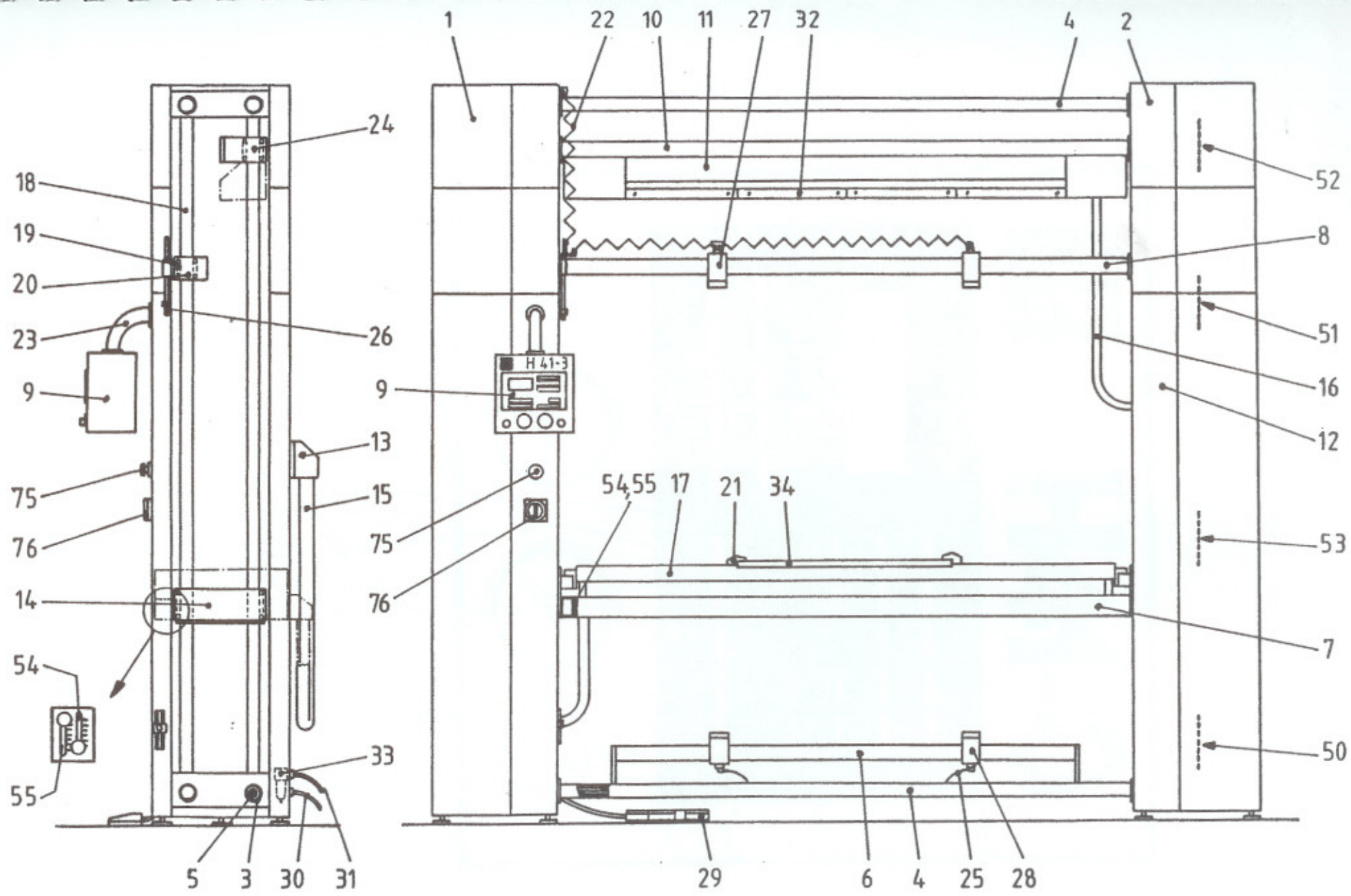
### Options

Language	.....
Emulsion feed PS	y / n
Emulsion feed SS	y / n
Dryer	y / n
Edge cleaning	y / n
Double coating	y / n
Triple coating	y / n
Quadr. coating	y / n
Capillary roll	y / n
Capillary sheet	y / n
Lateral frame loading	y / n

## HARLACHER AG

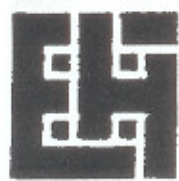
Kammistrasse 11  
CH - 3800 Interlaken  
Switzerland

Tel. ++41 (0) 33 / 827 02 10  
Fax ++41 (0) 33 / 827 02 15

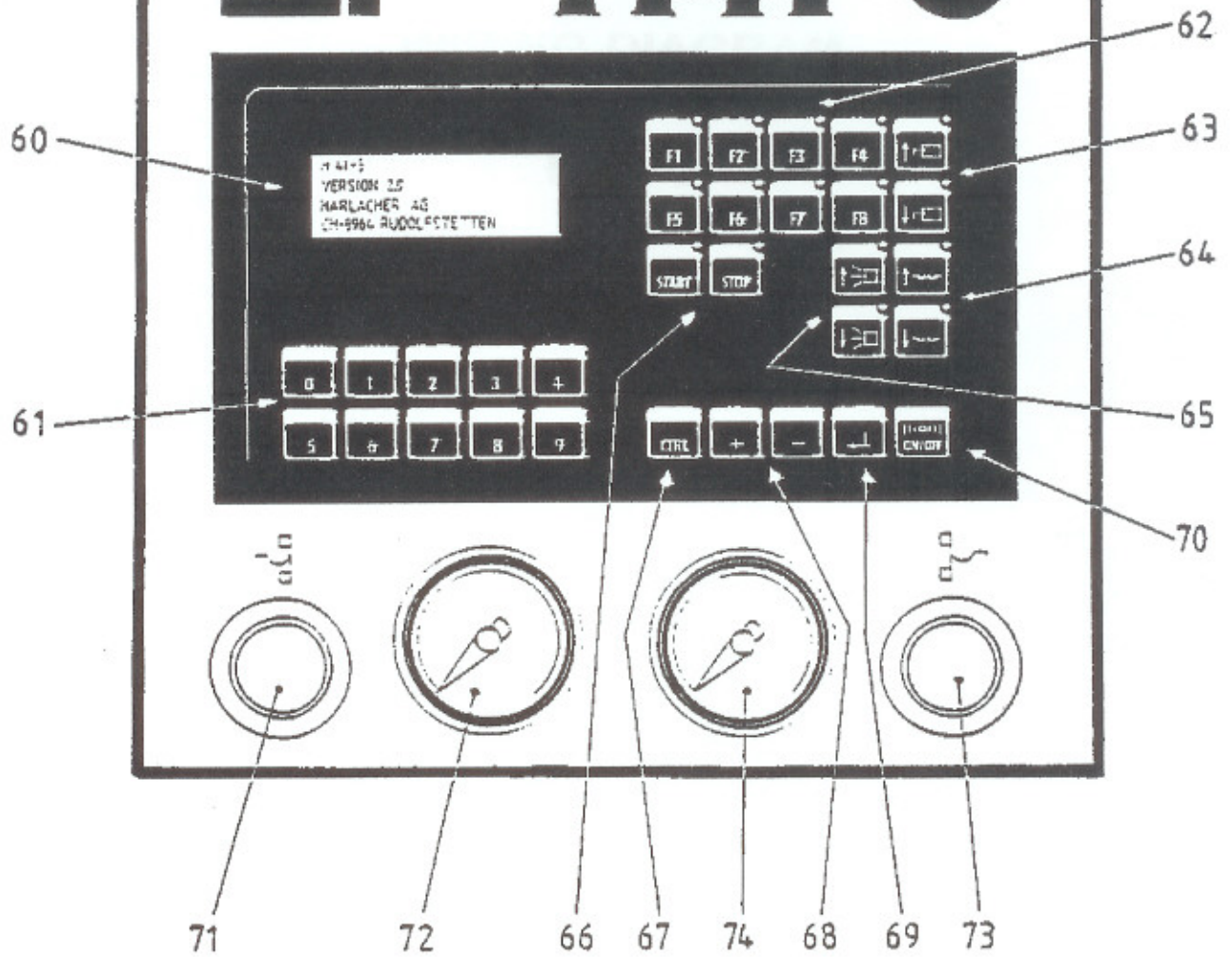


HARLACHER H 41-3





# H41-3

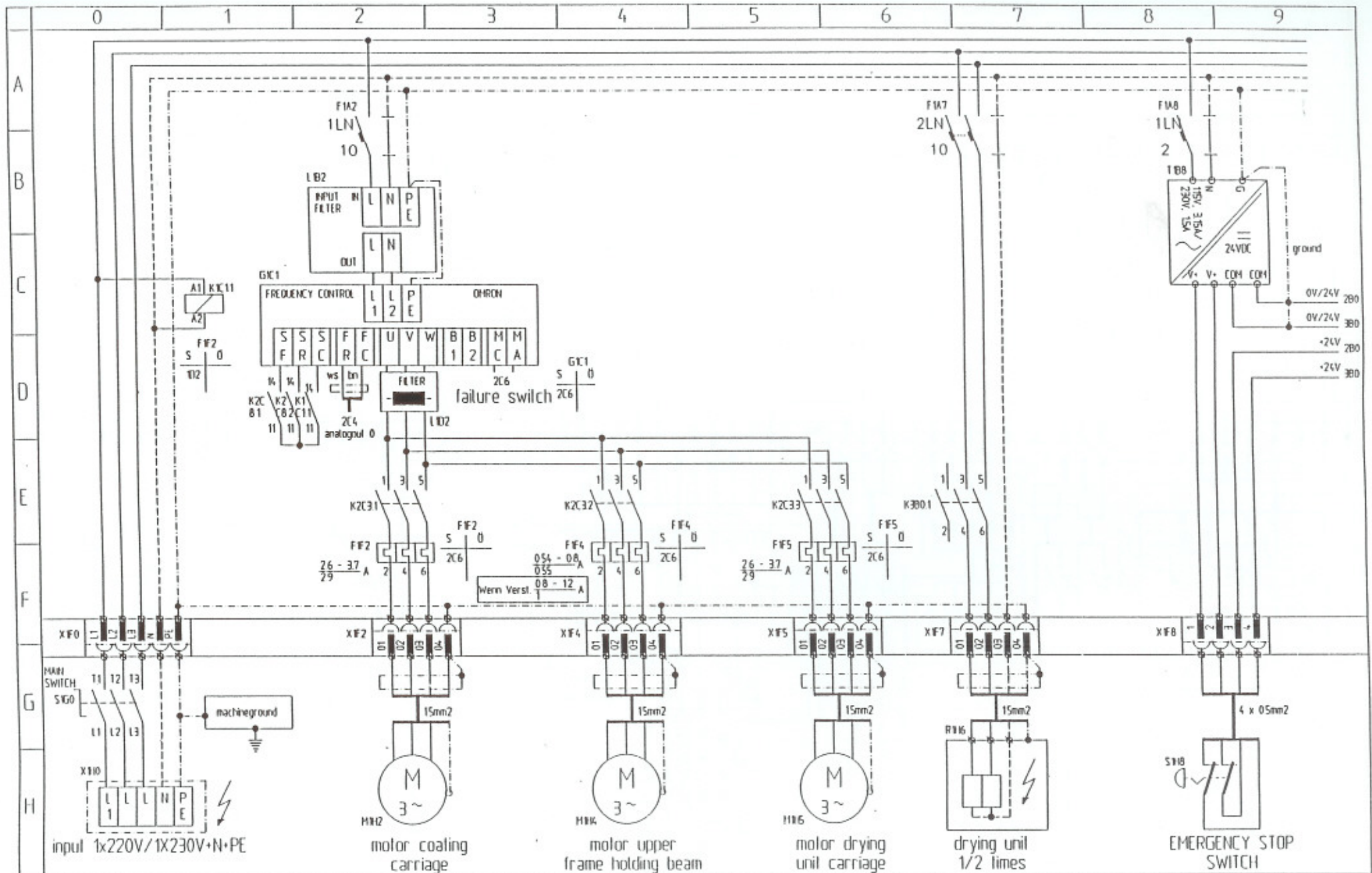


# **WIRING DIAGRAM**

**H 41-3**

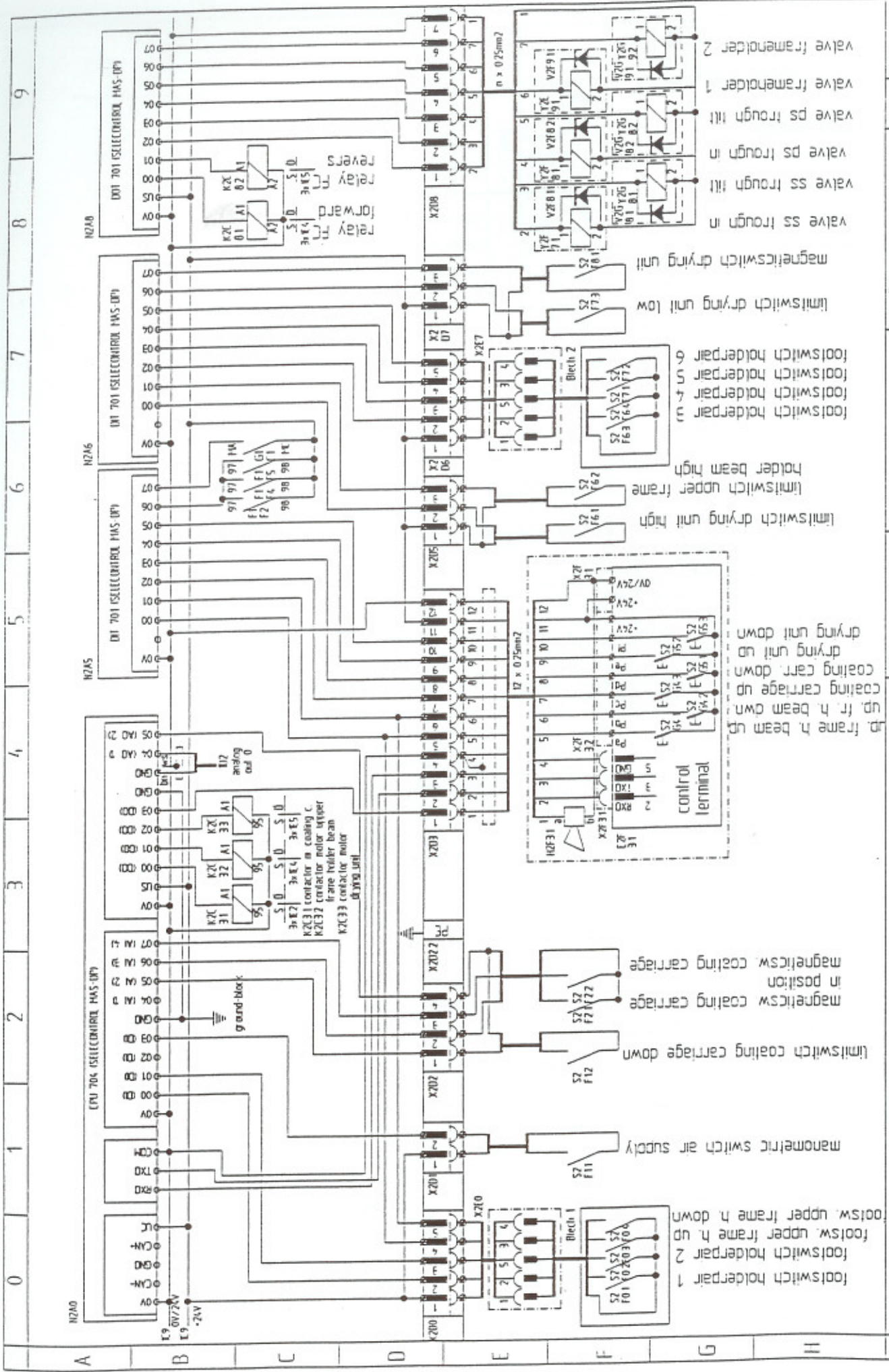
**Automatic Coating Machine**

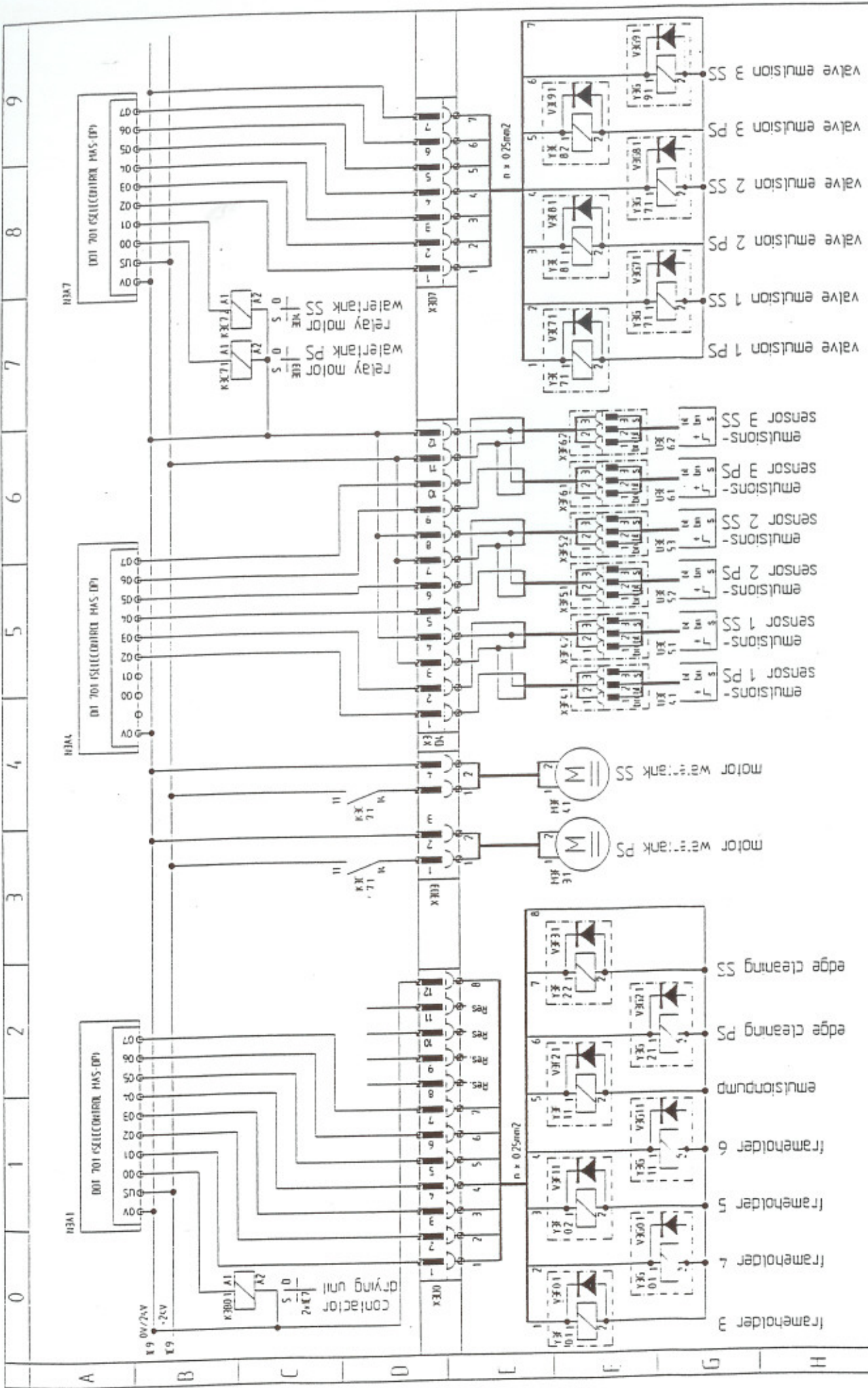
**HARLACHER AG**  
**Kammistrasse 11**  
**CH - 3800 Interlaken**  
**Switzerland**  
Tel    ++41 33 827 02 10  
Fax    ++41 33 827 02 15  
e-mail: [harlacher-ag@bluewin.ch](mailto:harlacher-ag@bluewin.ch)



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IMETRON AG, OBERDORFSTRASSE 4, CH-3855 BRIENZ									







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		8 Dezember 1996 / Cr	01 Mai 1997 / Cr		03 von 03

HAARLACHER AG, 114/1/3, options