

**OPERATOR'S
MANUAL
H41-4**

OPERATOR'S MANUAL AUTOMATIC COATING MACHINE HARLACHER H41-4

Serial No.	41.____
Max. frame size (outer)	____ mm x ____ mm (width x height)
Date of manufacturing	____
Software	SPS V 02.____ / Text V 01.____
Electrical connection	__ x __ V (+6/-10%) + N + PE 50 / 60 Hz
Power consumption / current	0.8 kW / 3.5 A
Compressed air supply (dry)	5 to 10 bar, bis 5 litre / min.
Noise emission	below 70 dB
Colours	white RAL 9010 / blue RAL 5017
Options	none

Observe

Before connection and/or using the above mentioned machine, you must read this manual completely and carefully to avoid any injuries or damages!

HARLACHER AG
Kammistrasse 11
CH - 3800 Interlaken
Switzerland
Tel +41 (0)33 827 02 10
Fax +41 (0)33 827 02 15
info@harlacher.ch
www.harlacher.ch

Register

Valid from Serial No. 41.6584
(Version with Touch Panel)

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Section 2

Wiring diagram

01.06.2006

1 General information

1.1 Range of applications

This machine is intended for coating flat screen printing stencils vertically with photo-emulsion or optionally capillary film. It will coat coarse to fine mesh made of polyester, nylon or stainless steel, attached to a suitable printing frame. With max. specified dimensions (outside) shown of the front page of the manual. The minimum screen tension for photo-emulsion is approx. 10 N/cm and for capillary films 15-20 N/cm

1.2 Correct length of coating troughs

The standard coating trough length can be calculated according to the list below. The troughs are normally delivered as a pair, where the front trough (squeegee side, SS) has red end caps and is always 20 mm or 4/5" longer than the rear one (printing side, PS) with black end caps. Do not use pairs with less difference and always mount the red one in front of the machine.

Observe: Be very careful with very large frame formats, the bowing in the middle of the frame needs to be measured, not to collide there with the red (SS) coating trough!

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

2 Safety regulations

2.1 Introduction

All HARLACHER machines are designed for maximum safety of personnel, machine and material. They are in conformity with the provisions of the significant directives and standards (CE).

This machine is determined for industrial use and must be operated by trained staff only!

This operators manual, especially its safety instructions and danger signs must be obeyed at all times!

2.2 Warning 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 inquiries and/or permanent physical damage

3 Location of the machine and tips

3.1 Requirements for location of the machine

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 between coating machine and drying compartment
- dust free environment, constant room temperature and humidity

The required space for the machine depends on its size, type of frame loading and options:

- the space between the rear side of the machine and a wall must be at least 50 cm for standard machines, 100 cm for machines working with the HARLACHER H17 Film-Applicator
- there must be enough space on both sides of the machine for maintenance access. When the frames are loaded from the side, we suggest a distance of at least the max. frame size plus 100 cm.
- The room height must be at least 30 cm higher than the outside dimensions of the machine to accommodate installation and maintenance

3.2 Transport, unpacking and checks



WARNING

Suitable equipment must be used for lifting and transporting the crates and heavy machine parts!

Check the packing for any damage upon arrival. If damage to the crate can be determined, this must be forwarded in written form and with photos of the damage to the forwarder who delivered the goods. Inform HARLACHER and your transport insurance immediately and follow their instructions.

Move the crates as close as possible to the planned final location of the machine. Carefully open the lid of the crate and/or the long front side (especially with fully assembled, standing machines) and examine the contents carefully. In case of shipping damage or loss, immediately Stop unpacking and contact HARLACHER or their agent, the freight forwarder and the shipping insurance to get further instructions.

Remove all parts carefully and check the contents with the packing list. If anything is missing or damaged, contact HARLACHER immediately.

3.3 Installation and assembly

If the machine is delivered in sub-assemblies, the final assembly must only be carried out by a HARLACHER technician or a third party authorised by HARLACHER. If the machine is delivered fully assembled (possible with small frame formats), you may begin levelling, connection (electric and pneumatic) and performance tests.

We would like to remind you that, installations done by a HARLACHER technician or by unauthorised parties are reflected in our guarantee conditions.

We decline any responsibility for damage or follow damage caused by assembly by unauthorised parties!

3.4 Electric connection



WARNING

The electrical connection must be done by a licensed electrician according to the supplied diagram as well as to the specifications on page 1 of this manual.

3.5 Compressed air supply and general settings



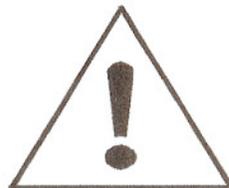
CAUTION

Shut off the air supply hose before you connect and secure the delivered auto-lock quick fitting. The fitting is suitable to the compressed air connection on the machine. Switching of the main electric switch does not shut off the air supply. The air supply must always be disconnected before working with the pneumatic system!

The connected compressed air must be sufficient for machine functions. The compressed air must be oil and water free. A minimal and constant pressure of 6 bar is essential for machine functions. Set the entry pressure manometer to 5 bar. The water separator is situated under this manometer. The water separator must be checked regularly and emptied if needed by pressing the knob at the bottom. A pressure switch interrupts the machine if the pressure drops below 4 bar (as long as the pressure is below this value, the machine can not be started again):

Coating trough pressure	the coating troughs are pressed horizontally against the mesh pm the SS and PS by individually regulated pneumatic cylinders. The pressure can be adapted for different applications.
General rules are	the longer the coating troughs, the higher the used pressure should be.
Suggested band width	approx. 3 - 6 bar

3.6 Levelling and performance tests



CAUTION

The entire machine has been factory adjusted and tested. Nevertheless, due to safety regulations, it is vital that all functions are tested before operating the machine.

3.6.1 Levelling

Ensure that the machine is set up exactly horizontally in the x and y axis and that the z axis (which is formed by the four vertical profiles of the machine) is exactly vertical to the horizontal axis. We recommend a levelling device to set up the machine, water levels and the like, are not sufficient to reach an optimal adjustment. Perfect levelling is a requirement for perfect coating!

3.6.2 Emergency Stop

During a practice run (without a frame and coating troughs) press the emergency stop. The machine stops immediately and the coating troughs move into the horizontal position so that no emulsion runs out of them.

3.6.3 Lower end switch coating carriage

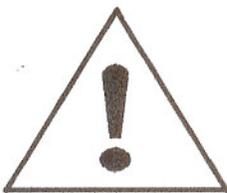
Move the coating carriage down to the lower end switch until the end switch reacts and the coating carriage stops.

3.6.4 Upper end switch frame holder

Move the upper frame holder up to the end switch until the end switch reacts and the frame holder stops. When the upper frame holder is on the end switch, you should not be able to open or close the clamps. When the upper frame holder moves off the end switch, the clamps can be operated again.

4 Setting up and preparation

CAUTION



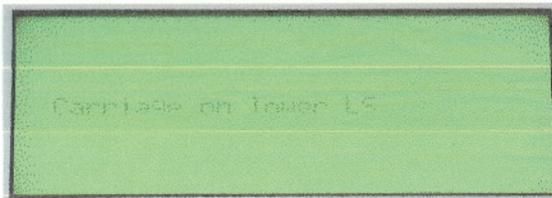
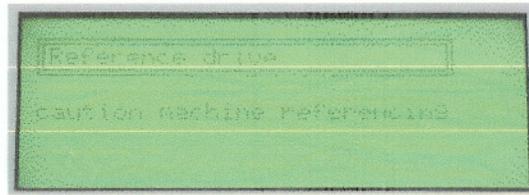
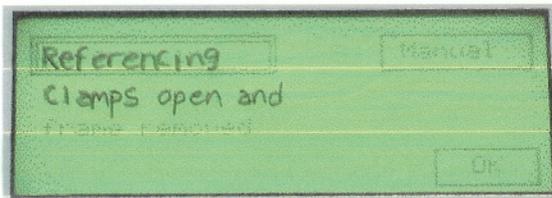
Correct adjustment of the machine and frames is very important to avoid any damage and to get perfect coating results. Use suitable equipment to handle large and heavy screens

Before coating any frames, the machine must be prepared as follows:

The coating carriage must be on the lower end switch to be able to open the clamps. The upper frame holder must be on the upper limit switch. Now you may begin the preparations.

4.1 Referencing the control unit

The intelligent control of the machine, requires a reference after every electric interruption (switching off the machine). By referencing the control unit, you ensure that the machine has the necessary reference point (0 – points beneath the max. frame size). The manual or programmed functions are then based on this reference point



4.2 Centring and clamping the frame

The tensioned frames must be placed in the machine so that the printing side faces the back and the printing side faces the front. The referencing area for the entire process is always the mesh area.

The coating machine is created for a max. frame size but not for a minimum frame size. For this reason, the clamps should be positioned in relation to the frame size, so that approx. $\frac{1}{4}$ of the frame is on the outside of each clamp. The centre of the frame must correspond with the centre of the coating troughs. The centre of the troughs is the allan screw on the coating carriage, which can be adjusted by means of an allan key. The frame stop at the upper frame holder can be used when working with several frames of the same size.

Front and side loading: the H41-4 allows you to load frames either from the front or from the side. When loading from the front, place the frame in the lower frame holder and move the upper frame holder down towards the frame manually. When the upper frame holder reaches the frame, it stops automatically. Now the clamps can be closed by means of the foot pedal.

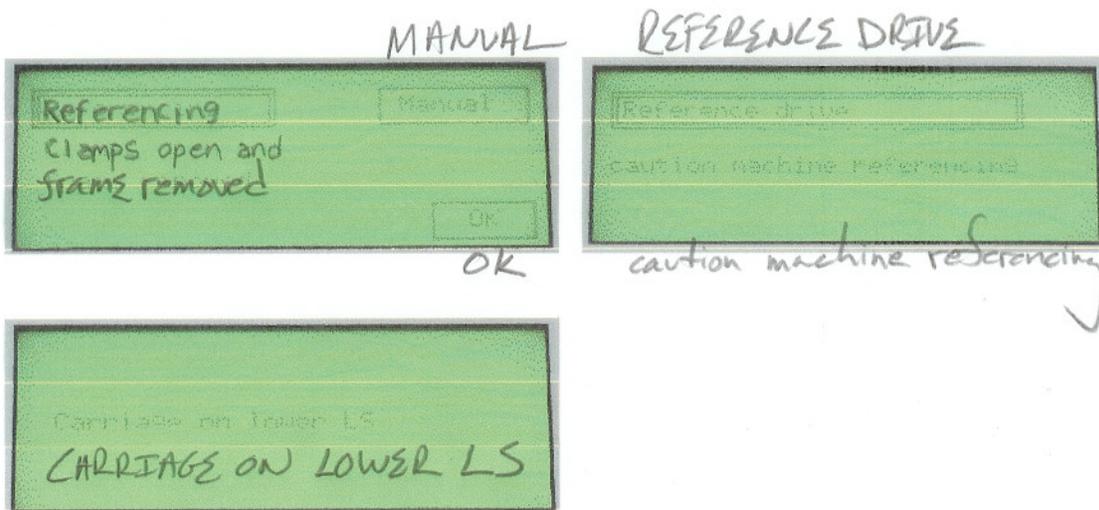
When loading the frames from the side, please proceed as follows: slide the frame a short distance into the machine and move the upper frame holder down to the frame, when the upper frame holder stops at the frame, move it up slightly. Now the frame can be slid to the correct position and the clamps can be closed.

4.3 Selecting the coating trough lengths

Please see point 1.2

4.4 Coating troughs / emulsion

Attach the coating trough to the appropriate trough holding profile (red on the squeegee side SS, black on the printing side PS). Remove the edge protection before filling the troughs with emulsion and replace them after the troughs have been cleaned.



4.2 Centring and clamping the frame

The tensioned frames must be placed in the machine so that the printing side faces the back and the printing side faces the front. The referencing area for the entire process is always the mesh area.

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4.3 Selecting the coating trough lengths

Please see point 1.2

4.4 Coating troughs / emulsion

Attach the coating trough to the appropriate trough holding profile (red on the squeegee side SS, black on the printing side PS). Remove the edge protection before filling the troughs with emulsion and replace them after the troughs have been cleaned.

Before starting the coating process, fill the troughs with sufficient emulsion. The max. filling capacity is approx. 1 litre per meter of coating trough. For optimal selection and application of emulsion, please contact your emulsion supplier or refer to the information sheets.

4.5 Selection coating trough pressure

Select a basic setting of 3 bar at the print and squeegee side. A general rule is: the longer the coating troughs, the higher the pressure.

5 The control unit

5.1 Introduction

The control unit is an intelligent, freely programmable control unit based on a dialog system which offers every comfort. The logic build up allows for simplified programming and you will be comfortable with the control unit very quickly.

The main components of the control unit are:

- one CPU
- one touch panel to enter the dialog
- digital rotation encoder

5.2 Logical build up of the control unit

The prerequisite for working with the control unit is the referencing as described in point 4.2. There after the unit can be controlled and programmed easily with the logical steps in the control unit. Access to the control unit is secured in the following way:

Code 414 allows programming the machine in the main menu – setup - settings

Code 300 allows access to the service section in the main menu – setup - service

If the operator only works in the automatic mode, i.e. only uses previously saved programs, no code is required!

Access to the section service settings – installation is locked. This code is only known to HARLACHER as only HARLACHER performs any programming in this area

All options are described separately. The following chapter is for a standard machine without options.

5.3 Main menu



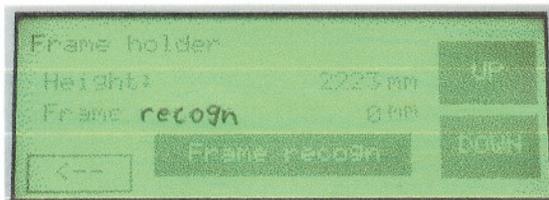
MAIN MENU

MANUAL DRIVE
AUTOMATIC
SET UP
INFORMATION

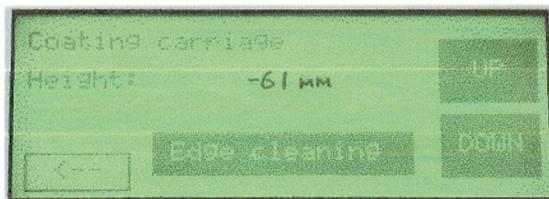
5.4 Manual drive (main menu)



These functions allow you to move the upper frame holder and coating carriage manually



*Height refers to current height of the upper frame holder
Frame recogn refers to the position of the frame holder*



Height refers to the „recognised frame height“

5.4.1 Manual drive from options (main menu)

Option coating trough edge cleaning dry or wet
With this function, coating trough edge cleaning activated once

Option dryer
The carriage with the hot air drying drives UP and DOWN

Option conveyor belt
To move to the left, press L, press R to move to the right

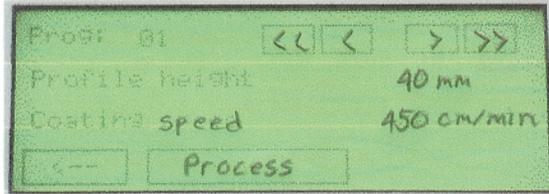
5.5 Setup (main menu – programming)

In the setup section, select programming to set the technical parameters i.e. frame profile, screen and the individual coating processes, of your program. Each program is given a number (1 – 99) in order to save the program and recall it at any given time. Programming follows a logical process which is broken up into single operations. Each operation has a number which is listed below

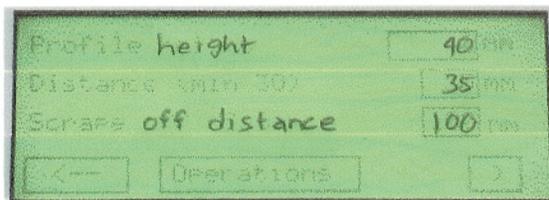
SETUP



PROGRAMMING
SETTINGS
SERVICE



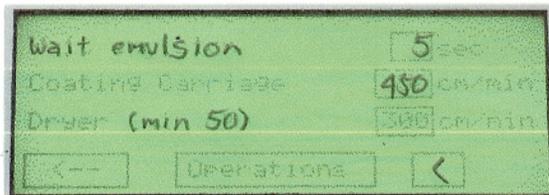
Select the program no. and enter the technical parameters



Frame profile height plus distance and scrape off distance give the height of the frame profile

Distance refers to the point where coating is started from the frame profile (no value less than 30 mm can be entered as this will lead to a collision between the frame and the troughs)

Scrape off distance refers the distance the coating troughs travel after they have been tilted into the horizontal position

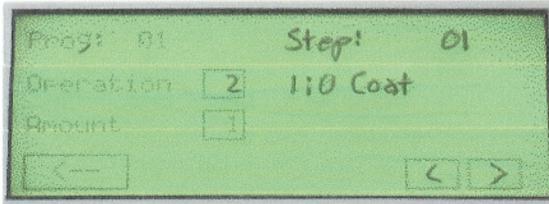


Wait emulsion refers to the time required for the emulsion to move completely to the mesh after the coating troughs have been tilted into the vertical position or the time required to move away from the mesh when the troughs have been tilted to the horizontal position.

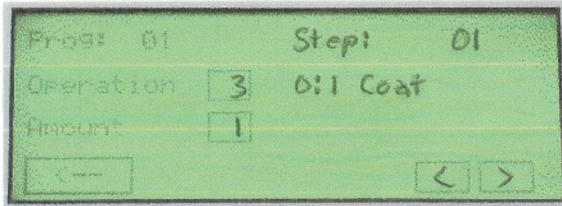
Thin emulsion requires a shorter time period, thicker emulsion needs more time (in seconds 2 – 99)

The coating speed can be selected between 120 and 900 cm/minute

Now you have programmed the technical parameters. Now you may begin programming the actual operations are split into steps. Step 1 selects the first operation and how many time this operation is to be repeated within step 1. This form of programming enables you to select the exact process to meet your processing requirements. Now each step can be programmed in the same way. Each program must be completed with operation 13!



Operation 2 coats on the squeegee side (SS),
i.e. 1:0



Operation 3 coats on the printing side (PS),
i.e. 0:1

Operation 4

Drying (Option)

Operations 5 to 7 are for capillary film application

Operation 5

applying film without coating trough on SS
(option)

Operation 6

applying film plus coating trough tilted in the
vertical position of the SS (filled with emulsion,
water, etc.) (option)

Operation 7

applying film plus coating trough in the
horizontal position on the SS (option)

Operation 8

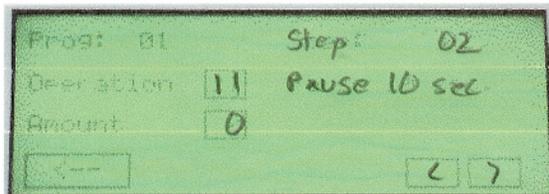
coating troughs at the mesh in a horizontal
position (scrape on both SS and PS)

Operation 9

coating troughs on the SS at the mesh in a
horizontal position (scrape SS)

Operation 10

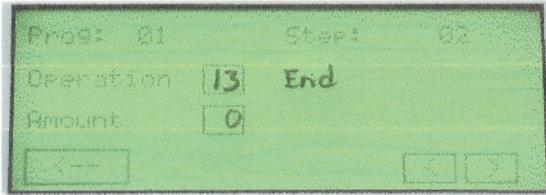
coating troughs on the PS at the mesh in a
horizontal position (scrape PS)



Operation 11 defines the pause between
defines the individual steps, i.e. 1 pause 10
seconds, 2 pauses 20 seconds etc.

Operation 12

empty



Operation 13 is always the last programmable operation so that the program can be ended and saved

By entering operation 13, which is necessary to save the programs, program 1 can be entered and saved.

If you would like to create more programs, return to setup and write the next program under no. 2.

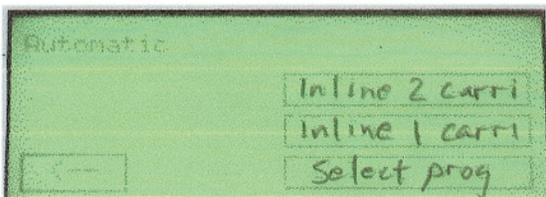
5.6 Automatic (main menu / program is already written and saved)

After the program has been saved and is therefore available for use, the frame has been correctly placed in the machine, the clamps have been closed and the coating troughs have been positioned correctly, you may now work in the automatic mode of the machine.

Additional pre-requisites for the automatic functions are as follows:

- Closed clamps
- The upper frame holder is not positioned on the safety end switch
- The coating carriage is positioned on the lower safety end switch

The saved parameters of the program can be checked now!



Press select prog to view the parameters of the program then press start. The frame will be coated perfectly according to the saved program. The end of the program is displayed.

5.7 Interrupting a running program

by pressing stop:

the coating carriage stops and the coating troughs tilt into the horizontal position. The carriage must be driven back to the starting position manually.

by EMERGENCY STOP:

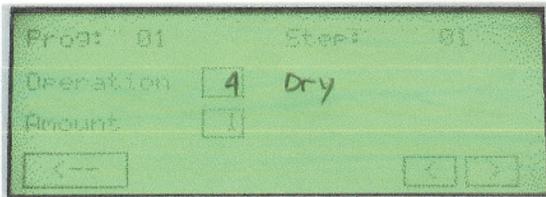
the coating carriage stops and the coating troughs tilt into the horizontal position. The flow of current in the machine is stopped and needs to be re-started by turning the emergency stop switch. Thereafter, the carriage must be driven back to the starting position manually.

5.8 Options

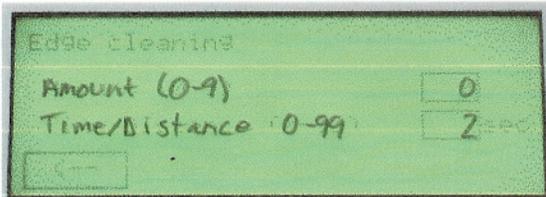
5.8.1 Dryer (hot air dryer)

The drying process can be programmed freely. Operation is to be integrated into the program and any number of cycles at what ever point in time can be selected (eg. for building up coating thickness, drying can take place between coatings).

The temperature of the warm air can be adjusted from min. to max. directly on the dryer. We do not recommend drying with high temperatures, rather with repeated cycles.



5.8.2 Coating trough edge cleaning dry (main menu – setup – settings – edge cleaning)



Amount refers to the amount of cleaning cycles, we recommend 2
Time refers to the speed of the cleaning lip or sponge, we recommend 2 seconds per meter (of frame width)

5.8.3 Coating trough edge cleaning wet

Please see coating trough edge cleaning dry above

5.8.4 Additional clamps (clamp pair 2)

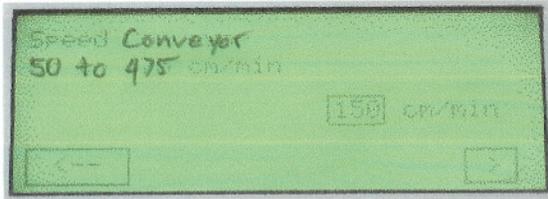
An additional foot-pedal enables separate operating of one or two clamps at the upper or lower frame holder. This option is used when two frames of the same height are coated simultaneously

5.8.5 Inline functions with conveyor belt (manual)

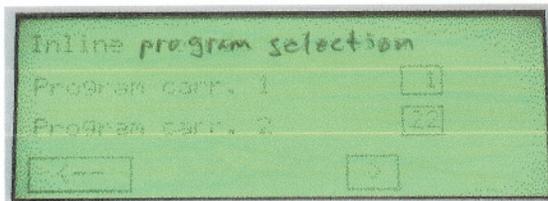
This option allows the frame to be loaded or unloaded by means of a conveyor belt. The conveyor belt is operated by means of a foot-pedal. Two pedals, one for each directions, is

available. The speed of the conveyor can be programmed in main menu – setup – conveyor.

The connection to machines on either side of the coater is possible.

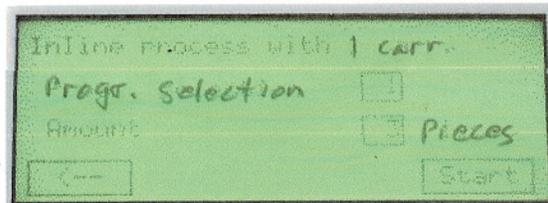


5.8.6 Two coating trough sizes / coating carriage 2 (manual)



This option allows you to coat two frames with different widths without first having to change the coating troughs. Carriage 1 or 2 can be allocated in the program (with the suitable coating trough on each carriage)

5.8.7 Inline functions with conveyor belt and connection machines before and after the coater



With carriage 1, you are able to coat several frames of the same size which are fed by a connecting machine before the coater (e.g. magazine) and then fed into a connecting machine after the coater (e.g. machine, drying, developing unit etc.)

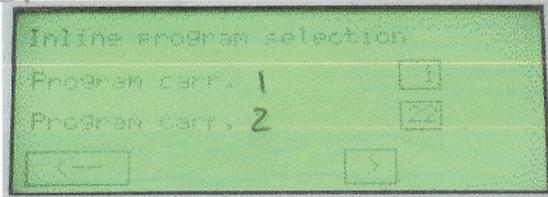
5.8.8 Inline functions with conveyor belt and automatic frame size recognition

This option can be used, when processing frames with the same frame widths but different frame heights. As part of the automated inline process, the H41-4 recognises the frame height coming from the previous machine and moves the upper frame holder to the appropriate height before the frame is completely entered the machine. Thereafter the inline process with the connecting machines is continued

5.8.9 Inline functions with conveyor belt with automatic frame size recognition and two coating trough sizes

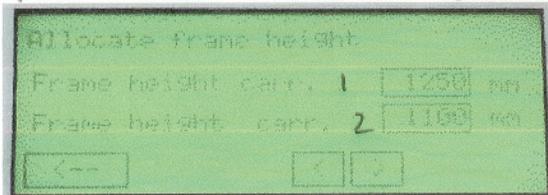
Same as in option 5.8.8 but with this option, two different frame widths (and therefore two different coating trough sizes) can be processed automatically

INLINE PROGRAM SELECTION



The desired coating program can now be allocated to the two different frame sizes.

ALLOCATE FRAME HEIGHT



The specific frame heights can now be allocated to carriage C1 and C2.

5.8.10 Additional clamps (clamp pair 3 – 6)

Additional foot-pedals allow you to separately operate one or two upper or lower clamps for every additional frame (with the same height) that is to be processed simultaneously.

5.8.11 Coating trough edge cleaning, coating carriage 2

5.8.12 Coating trough edge cleaning, coating carriage 2

5.8.13 Film applicator

This option is used when applying capillary film directly from the roll onto a screen. Operation 5, 6 and 7 are used exclusively for this options (please see operations)

5.8.14 Further options

Further options such as automatic emulsion transfusion, frame size recognition with bar code, program printer, modem for remote intervention etc. are available on request

6 Monitoring / error messages

The control unit continuously provides error messages e.g. when parameters which are not possible, are entered into the programming (e.g. when an option, which does not exist in the machine is programmed or a frame size which is larger than the machine size etc.)

Additional monitoring and error messages:

- Drop in compressed air pressure below 4 bar
- Drop or lack of electric current
- Error in the SPS (control unit)
- Overload of the protective motor switch
- Overload / error in the Frequency converter



CAUTION

When an error message arises, first the source of the error must be tested before you continue working with the machine!

7 Manufacturer / Machine information (main menu)

All the information necessary to identify the machine clearly can be found in the main menu under the section machine information – manufacturer. In case of an inquiry, this information should be at hand so that we can support you as quickly as possible.

8 Maintenance Instructions



DIRECTIONS

If the maintenance instructions are followed carefully, the machine will work satisfactorily over a long period of time, disregarding these instructions may lead to a guarantee regress

In general: the machine should always be kept clean and dry, especially after spillage of emulsion. Any emulsion spillage must be cleaned with water immediately and dried thoroughly. Blank metal parts must be greased/oiled slightly.

Periodic controls, cleaning and oiling plan

daily:

- Clean coating trough immediately after use

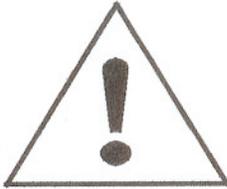
- If the option coating trough cleaning dry is present, the rubber rip needs to be cleaned daily. If coating trough cleaning wet is present, the sponge and the holder must be thoroughly cleaned
- With the optional conveyor belt, dirt and debris needs to be removed from the belt

weekly:

- The water separator at the compressed air connection needs to be checked and emptied by pressing the button
- Visual check of all moving parts, the tension of the toothed belt and the horizontal position of the various parts (carriage, frame holder, drying unit)

Monatlich:

- Clean all guiding rails and grease slightly with „Molykote Fett Longterm W2“
- Piston rods of the pneumatic cylinders as well as the linear guides of the coating troughs must be oiled slightly with e.g. „WD 40“
- If a drying unit is present, the air filter must be checked for dirt and if necessary cleaned
- If a conveyor belt is present, the belt tension needs to be checked



CAUTION

Any damage must be checked and dealt with immediately. In case of uncertainties, contact HARLACHER or their agents.

Section 2

Wiring diagram