

# OPERATING INSTRUCTIONS

(Translation of the original instructions)



## MHM SCREEN PRINTING MACHINE SYNCHROPRINT 5000

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## Preface

Dear Customer,

Congratulations and thank you for choosing the MHM Synchronprint 5000. This machine is designed to provide the highest standards of performance and reliability throughout its normal operating life. Highly innovative and precise MHM technology provides a combination of the finest build quality along with optimal safety. We trust these Operating Instructions will assist you in becoming familiar with the safe and efficient operation of the Synchronprint 5000.

### **Important note:**

Due to our policy of continuous improvement we reserve the right to change specifications without prior notice. Therefore certain individual fittings and components may differ slightly from the model detailed in this document. For any further questions regarding your Synchronprint 5000, please contact the MHM service team.

*Wishing you every success with your future production...*

Machines Highest Mechatronic GmbH

## **Important advice regarding these Operating Instructions**

These Operating Instructions form an integral part of the Synchronprint 5000 and must be made available to all authorized personnel at all times. No particular sections or pages should be removed from these Operating Instructions, and any missing sections or pages should be replaced immediately, particularly in relation to section “1. Safety Instructions”.

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## Content:

Preface.....	2
Important advice regarding these Operating Instructions .....	2
1. Safety Instructions.....	5
1.1. Description of Key Words and Symbols in the Operating Instructions .....	5
1.2. General Information .....	6
1.3. Qualification of Operating and Service Staff .....	6
1.4. Required qualification for operations .....	7
1.5. Safety Instructions for the Operating Staff.....	8
1.6. Personal Protective Equipment .....	8
1.7. Additional Risks .....	9
1.8. Safety Signs on the Machine .....	10
1.9. Other Valid Rules and Regulations: .....	10
2. Intended usage of the machine.....	10
3. Data .....	11
3.1. Serial Number and Year of Manufacture .....	11
3.2. Dimensions.....	11
3.3. Specifications .....	12
4. Transportation and packaging .....	13
4.1. General Notes with Regard to Transportation and Danger Warnings.....	13
4.2. Packaging .....	13
4.3. Unloading of the crates.....	13
4.4. Packaging material .....	13
5. Assembly.....	14
5.1. General Assembly Instructions .....	14
5.2. Positioning of the Synchroprint.....	14
5.3. Ambient Conditions .....	14
5.4. External supply/Connection ports .....	15
5.4.1. Electrical Connections .....	15
5.4.2. Compressed Air Requirements .....	15
6. Commissioning the Synchroprint.....	16
7. Design and Operation.....	16
7.1. General Process Description .....	16
7.2. Overview Machine Parts .....	17
7.3. Control panel .....	17
7.4. Safety Devices .....	18
7.5. Pallets .....	19
7.6. Foot switch .....	19
7.7. Type Plate.....	19
7.8. Main Power Switch .....	19
7.9. Print Stations .....	20
7.9.1. Overview Manual Print Stations .....	20
7.9.2. Squeegee Arm Motor .....	21
7.9.3. Frequency Converter.....	21
7.9.4. Squeegee/print arm .....	21
7.9.5. Dryer connector.....	21
7.9.6. Screen Adjustment/Micro-Registration (only at manual screens) .....	22
7.9.7. Squeegee stroke length adjustment .....	22

7.9.8.	Squeegee/print arm lock-down .....	22
7.9.9.	Pressure control.....	22
7.9.10.	Control Keypad “print station”.....	23
7.9.11.	Control keypad “Screen Adjust” (only at automatic screens).....	26
7.9.12.	Squeegee Carriage.....	30
7.10.	Additional equipment .....	31
7.10.1.	Flash Cure Units.....	31
7.10.2.	Flocking Devices.....	32
8.	Danger Zones .....	33
9.	Control of the Machine .....	34
9.1.	Stopping the Machine in the event of an Emergency.....	34
9.2.	Stopping the Machine in the event of Malfunction.....	35
9.3.	Putting the Machine into Operation .....	35
9.4.	Configuration of the Control .....	35
9.5.	Hybrid-Control.....	35
9.6.	Operating the machine with tablet „m-touch pro“ .....	36
9.6.1.	Adjust.....	36
9.6.2.	Manually .....	39
9.6.3.	Automatic.....	41
9.6.4.	Screen positioning at automatic machines .....	43
9.6.5.	BasicSetup.....	46
9.6.6.	Help.....	47
9.7.	Blocked operation.....	47
9.8.	Operating the machine with the terminal .....	48
9.8.1.	Adjust.....	50
9.8.2.	Manual .....	51
9.8.3.	Automatic.....	52
9.9.	Error display.....	52
9.9.1.	Error messages terminal.....	52
9.9.2.	Error messages tablet .....	53
10.	Trouble shooting .....	53
10.1.	Basic errors (without error message).....	53
10.2.	Error messages control system .....	54
11.	Shutting Down the Synchronprint.....	56
11.1.	Switching Off the Machine after Normal Operation .....	56
11.2.	Long-term Shutdown .....	56
11.3.	Permanent Shutdown of the Machine .....	56
12.	Maintenance of the Synchronprint.....	57
13.	Terms of the Guarantee.....	59
14.	Limitation of liability .....	59
15.	Support, Customer Service and Hotline.....	59

## 1. Safety Instructions




This section describes the safety instructions for the correct and safe operation of the Synchroprint 5000. In addition, this section also contains references to the European rules and regulations concerning the guarantee of industrial safety along with safety at the workplace. These rules and regulations provide the basis for these operating instructions.

These Operating Instructions include:

1. General safety instructions.
2. Special safety instructions, if they are relevant to a specific section, at the beginning of that respective section.
3. Special safety instructions, if they are important for detailed sequences of operation, before the description of that respective sequence of operation.
4. Indications to read such instructions included in the respective section.

### 1.1. Description of Key Words and Symbols in the Operating Instructions

In these operating instructions classified key words and symbols are used to identify dangers and items that require special attention. Particular attention is to be paid to the sections marked in this manner, because they contribute to personal safety as well as the prevention of damage to the Synchroprint.

Symbol	Key word	Meaning
	DANGER	This symbol indicates possible risk to life.
	CAUTION	This symbol indicates danger of damage to property and/or environment.
	NOTE	This symbol indicates useful additional information and operating suggestions.

## **1.2. General Information**

The Synchroprint 5000 (hereon named Synchroprint) is built in accordance to all appropriate safety regulations. Owing to its complex design, the Synchroprint must only be operated and maintained by suitably skilled staff.

Installation, operation or maintenance of the Synchroprint by persons who have not been suitably trained, introduced or acquainted with the system and informed regarding the possible dangers may result in:

1. Failure of essential functions of the Synchroprint.
2. Danger to persons through electrical or mechanical actions.
3. Material damage to the Synchroprint.

## **1.3. Qualification of Operating and Service Staff**

‘Qualified personnel’ refers to people who are able to carry out the required procedures and be able to recognize as well as prevent potential risks, as a result of their training and experience. Such personnel should have a good knowledge of any relevant standards, regulations, rules of accident prevention and internal conditions etc.

Every person instructed to perform any operation on the Synchroprint must:




1. Be physically and mentally capable of coping with the respective tasks.
2. Be suitably instructed in operating the Synchroprint.
3. Be familiar with the Operating Instructions, in particular the general safety instructions in the individual sections, and have read and understood them.
4. Be aware of any additional general safety regulations of any local authorities/associations.
5. Be aware of the principles of industrial hygiene and be able to demonstrate them.
6. Be aware of the contents of suppliers’ safety instructions, should they affect his/her area of responsibility.
7. Be aware of any relevant safety devices at the workplace and be able to use them.
8. Be informed regarding the prevention of environmental damage in respect of his/her area of responsibility.
9. Be informed regarding the prevention of material damage in respect of his/her area of responsibility.

If casual workers are employed for assistance work they must be particularly informed regarding existing and potential dangers and instructed accordingly.

## 1.4. Required qualification for operations

Skill	Assistant	Operating personnel	Maintenance personnel	Service personnel
Color refill (only at standstill)	X	X	X	X
Unloading substrates	X	X	X	X
Cleaning of the machine (only at standstill)	X	X	X	X
Setting screens	X**	X	X	X
Equip flood and print squeegees	X**	X	X	X
Equip the screens	X**	X	X	X
Adjust squeegees	X**	X	X	X
Clean of the screens in clean mode	X**	X	X	X
Equip machine with dryer or changing the position	X**	X	X	X
Applying substrates		X	X	X
Enable and disable printing heads		X	X	X
Enable and disable of dryer		X	X	X
Start of all printing processes and adjustment work		X	X	X
Activities at the maintenance unit		X	X	X
Lubricate of the machine		X	X	X
Shutting down the machine		X	X	X
Long-term shutdown			X	X
Permanent shutdown of the machine			X	X
Maintenance and repairs at the pneumatically system			X*	X
Maintenance and repairs at the electrical system			X*	X
Maintenance and repairs at the mechanical system			X*	X
Maintenance and repairs at additional units			X*	X
Maintenance and repairs at the electronically system				X
Maintenance and repairs at the safety system				X
<p>* only with the required qualification</p> <p>** only together with the operating personnel</p>				

## 1.5. Safety Instructions for the Operating Staff

 <p><b>DANGER</b></p>	<p>All cabinets and covers on the Synchronprint must always be kept closed. Open cabinets and covers are extremely dangerous as live electrical components are accessible.</p> <p>Mechanical or electrical failures must only be repaired by an MHM authorized/approved technician.</p> <p>On every occasion, the operator should check the correct functioning of the safety devices (Emergency STOP), before commencing use of the Synchronprint.</p> <p>No modifications to any part of the machine or its assembly system that may adversely affect safety must be carried out without the prior approval of MHM.</p> <p>Program modifications in the control program and changes of settings which may affect the Synchronprint's operation should only be carried out by an MHM authorized/approved technician.</p>
 <p><b>CAUTION</b></p>	<p>All working spaces, passageways, escape and emergency routes and exits must be kept clear.</p> <p>No tools or other objects must be kept or left in the area of the machine.</p> <p>Any modifications or changes to the Synchronprint's settings should only be carried out by an MHM authorized/approved technician.</p> <p>Always wear protective gloves and safety goggles during cleaning work, in particular when using solvents!</p> <p>Any remains of potentially harmful substances should be disposed of according to the legal requirements of the country or state in which the Synchronprint is operated.</p>
 <p><b>NOTE</b></p>	<p>All accessories for service and maintenance work (e.g. cleaning agents) must be collected in suitable containers and disposed of according to any relevant regulations.</p>






## 1.6. Personal Protective Equipment

Personal protective equipment must be used at work. This equipment comprises close-fitting working clothes with tight sleeves and high tearing resistance without any protruding parts. These features prevent operators from getting caught by moving machine parts.





## 1.7. Additional Risks

Even though the Synchronprint has been designed and built according to the most stringent safety criteria, as with all machinery we have to anticipate certain additional risks, which are detailed below:

Danger	Description	Behaviour/Action
<p>Electrical threats: Indirect contact (in case of defect)</p> 	<p>Danger of life-threatening electrical shock by indirect contact with defective parts carrying voltage (in particular in case of defective insulation).</p>	<p>Disconnect the machine from power supply by switching of the “main power switch”.</p>
<p>Mechanical threats: Crushing</p> 	<p>Crushing of parts of the body - in particular arms and hands.</p>	<p>Be aware of moving parts whilst operating the machine. Wear protective clothing at all times.</p>
<p>Mechanical threats: Getting caught or trapped</p> 	<p>Danger through moving parts (linear or rotary drive systems).</p>	<p>Danger in reaching into, under or over the machine. Only reach into the machine from the indicated points. Wear suitably fitting clothing, particularly in the area of the arms.</p>
<p>Mechanical threats: Slipping, stumbling and falling</p> 	<p>Danger of falling (e.g. obstacles on the floor).</p>	<p>The floor area around the machine must be kept free from any obstacles.</p>
<p>Danger through contact with or inhaling of substances</p> 	<p>Danger through contact with or inhaling substances or materials with harmful or toxic effects.</p>	<p>Observe the safety instructions for handling such substances.</p>

## 1.8. Safety Signs on the Machine

The following safety signs are attached to the corresponding points of the machine:

Danger	Description	Location
	Warning against squashing of parts of the body, in particular arms or hands.	At squeegee carriages.
	Warning of dangerous voltage.	At current-carrying parts of the machine with 230/400VAC.

The adhesive labels must be replaced if illegible (due to dirt or damage).

## 1.9. Other Valid Rules and Regulations:

The customer must comply with all regulations applicable in the country where the machine is located.

## 2. Intended usage of the machine

The machine is intended for the printing of substrates (usually textiles such as T-shirts, but also paper or similar materials) by means of screen printing. The substrates are conveyed by means of the “carousel system”. With the use of optional accessories the substrate can also be dried or treated with other finishing techniques (e.g. flocking).



Any other use of the machine than described above may result in danger to persons or material damage and is therefore forbidden.

### 3. Data

This section details the Synchronprint technical specifications.



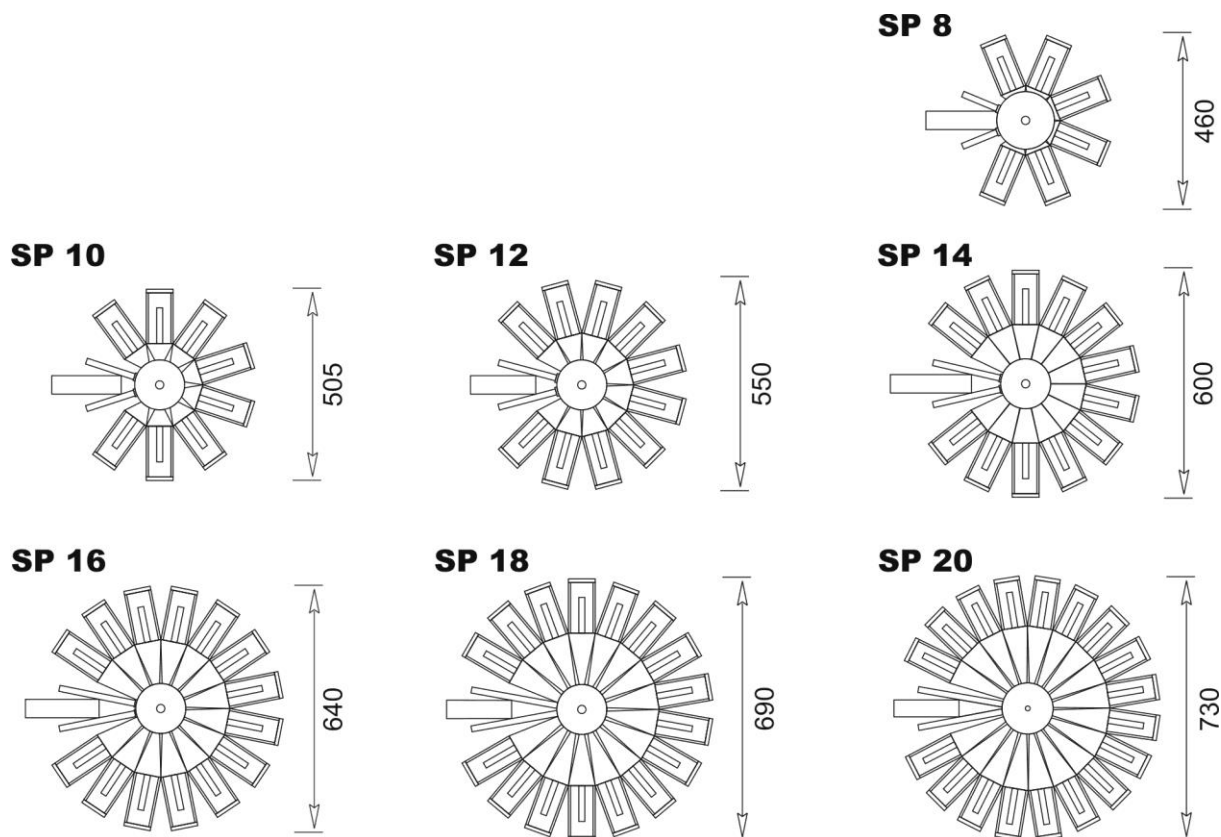
NOTE

NB: As our policy is one of continuous improvement, we reserve the right to change specifications without prior notice.

#### 3.1. Serial Number and Year of Manufacture

Serial number and year of manufacture are indicated on the machine's type plate.

#### 3.2. Dimensions



### 3.3. Specifications

Model/Type	SP 8	SP 10	SP 12	SP 14
Number of pallets	8	10	12	14
Max. No. of print stations	6	8	10	12
Max. print area (standard format)	50 x 70cm 20" x 28"	50 x 70cm 20" x 28"	50 x 70cm 20" x 28"	50 x 70cm 20" x 28"
Max. print area (large format)***	70 x 100cm 28" x 39"	70 x 100cm 28" x 39"	70 x 100cm 28" x 39"	70 x 100cm 28" x 39"
Max. diameter (std' format) [cm/inch] (Lg' format) [cm/inch]	460/181" 575/226"	505/199" 620/244"	550/217" 680/268"	600/236" 735/289"
Machine height [cm/inch]	185/72,8"	185/72,8"	185/72,8"	185/72,8"
Machine weight*	1800 kg 3970 lbs	2150 kg 4740 lbs	2300 kg 5070 lbs	2650 kg 5840 lbs
Ø air consumption [l/min.]	190	220	250	280
Minimum air pressure	8 bar / 116 p.s.i. (filtered, dry air only)			
Drive systems	AC-Servo-Drive Index / Electric Squeegee Drive			
Electrical Supply [V]	3 x 210/400V, 50/60 Hz (+/- 5%)			
Connected load - machine base	2.5 kVA			
Connected load - Squeegee drive	0.4 kVA (each)			
Ø power consumption [kWh]	0,9	1,05	1,2	1,35
Registration accuracy	+/- 0.02 mm / +/- 0.00078"			
Recommended frame/screen profile	40 x 40 mm / 1.57 x 1.57"			
Max. frame/screen size (O.D.)	75 x 110 cm / 30 x 42" Large format 95 x 140 cm / 37 x 55"			
Production capacity [pieces / h]**	1000			

Model/Type	SP 16	SP 18	SP 20
Number of pallets	16	18	20
Max. No. of print stations	14	16	18
Max. print area (standard format only)	50 x 70cm 20" x 28"	50 x 70cm 20" x 28"	50 x 70cm 20" x 28"
Max. diameter [cm/inch]	640/252"	690/271"	730/287"
Machine height [cm/inch]	185/72,8"	185/72,8"	205/81"
Machine weight*	3000 kg 6615 lbs	3350 kg 7386 lbs	3650 kg 8047 lbs
Ø air consumption [l/min.]	310	340	370
Minimum air pressure	8 bar / 116 p.s.i. (filtered, dry air only)		
Drive systems	AC-Servo-Drive Index / Electric Squeegee Drive		
Electrical supply [V]	3 x 210/400V, 50/60 Hz (+/- 5%)		
Connected load - machine base	2.5 kVA		
Connected load - Squeegee drive	0.4 kVA (each)		
Ø power consumption [kWh]	1,5	1,65	1,8
Registration accuracy	+/- 0.02 mm / +/- 0.00078"		
Recommended frame/screen profile	40 x 40 mm / 1.57 x 1.57"		
Max. frame/screen size (O.D.)	75 x 110 cm / 30 x 42" Large format 95 x 140 cm / 37 x 55"		
Production capacity [pieces / h]**	900	800	700

\* ..... Total weight (unpacked) with max. number of print stations

\*\* ..... Single print stroke and medium length of stroke

\*\*\* ... Special formats available upon request

## 4. Transportation and packaging

This section provides an overview of the proper transportation of the Synchroprint.

### 4.1. General Notes with Regard to Transportation and Danger Warnings



Danger of falling objects!

The following instructions must be observed

1. Never stand or walk under hanging loads!
2. Transportation must be carried out by qualified staff observing all safety instructions.
3. The Synchroprint must only be lifted at the dedicated lifting points.
4. Only the lifting/handling devices and equipment indicated in this document must be used for the movement of the Synchroprint. Non-compliance may lead to serious damage of the Synchroprint and result in cancellation of the warranty.



Upon delivery of the Synchroprint the consignment must be examined for external damage immediately. In the case of any damages, they must be documented and reported to MHM GmbH within 24 hours.

### 4.2. Packaging

The Synchroprint will be packed and delivered in wooden crates. The exact number, weight and dimensions will vary slightly according to each model/type of machine. Contact customer service for more information about individual orders.

### 4.3. Unloading of the crates

The Synchroprint is to be unloaded by the customer. A forklift truck with adequate fork length and lifting capacity (see 4.2 Packaging) will be required.



Danger of mechanical damage!

The Synchroprint must be lifted carefully and only at the dedicated lifting points at the middle of the base unit. Lifting the Synchroprint at/by any other point, especially the turntables, may result in serious damage. Be sure to maintain an adequate and safe distance during lifting.

### 4.4. Packaging material

After unpacking the machine, the packaging material must be disposed of according to local regulations.

## 5. Assembly

This section describes the external supply/connection ports of the Synchroprint and the points to be observed during assembly.

### 5.1. General Assembly Instructions



**NOTE**

The Synchroprint must only be installed / assembled by a service technician of the machine manufacturer or by an authorized service technician from an official MHM dealer/agent. Any assembly/installation by any third party not listed above will result in immediate cancellation of the warranty.

The customer should have a minimum of two persons available to assist the technician with the installation and assembly of the machine.

### 5.2. Positioning of the Synchroprint

The machine must be mounted on a bed with sufficient load-bearing capacity. In case of doubt this capacity is to be examined by a structural engineer.

In order to guarantee perfect installation and smooth operation of the Synchroprint, the machine must be installed at a sufficient distance from adjacent elements of the building (walls, columns, etc.) and/or other machines. The distance required in each case depends on the screen size, and must be chosen so as to allow the operator to replace the screens without any problems. The dimensions of the respective machine are indicated in Chapter “3 Data”.

### 5.3. Ambient Conditions

For the electrical equipment on the Synchroprint, ambient conditions according to standard IEC 60204 “Electrical Equipment of Industrial Machines” should be observed.

The following points should be observed in order to achieve efficient running and an optimum level of production with the Synchroprint:

1. The premises, where the Synchroprint is to be operated, must be kept clean, dry and well-aired.
2. The ambient temperature must not fall below +5° C or exceed +45° C.
3. Relative air humidity must not exceed 80 %.
4. The mains supply must not exceed or fall below a tolerance of +/- 5 % of the required voltage for the Synchroprint. If this voltage stability cannot be guaranteed, the customer must install a constant-voltage regulator to protect the Synchroprint against such fluctuations.
5. The compressed air must be clean, filtered and dry (class 1:4:1 according ISO8573-1:2010).
6. Compressed air supply must be sufficient in terms of pressure, volume and consistency.
7. Electricity supply should be sufficient with adequate fuse protection.
8. Maximum installation altitude is 2000m above sea level.

## 5.4. External supply/Connection ports

Connections for compressed air and mains electricity are located on the base unit of the Synchronprint as standard. Overhead supply connections may be ordered optionally but only at time of order, to enable supplies to enter the machine from above, through the centre column.



**CAUTION**

Danger of tripping over!  
In case of laying supply lines on the floor, it is necessary to attach step covers.

### 5.4.1. Electrical Connections



**DANGER**

Please observe the general safety regulations for electrical connections when connecting the mains supply to the Synchronprint. Avoid any contact with live components.

The electrical requirements are as follows:

Description	Requirement/Value
Supply voltage	3x 210/400V
Supply frequency	50/60 Hz $\pm$ 5 %
Connected load	2.5 kVA + (0.4 kVA x "number of print heads") (= "power for indexer main drive" + "power per print head" x "number of print heads")



**NOTE**

All flash cure units must be supplied through a separate/independent connection. Please observe the precise technical data from the flash cure unit specification sheet.

### 5.4.2. Compressed Air Requirements

Type of machine	SP 8	SP 10	SP 12	SP 14	SP 16	SP 18	SP 20
Air consumption (l/min.)	190	220	250	280	310	340	370
Minimum air pressure	8 bar / 116 PSI						
Air quality	filtered, dry air supply only (class 1:4:1 according ISO8573-1:2010)						



## 6. Commissioning the Synchroprint



NOTE

Before starting the machine, mains connection and compressed-air supply must be checked and, if necessary, established according to the instructions.



NOTE

Initial start-up of the Synchroprint should only be carried out by an authorised MHM service engineer or by an approved technician from an official MHM dealer/agent.

After the initial start-up of the machine, commissioning is to be completed in the presence of the authorized technician along with any persons authorized on the part of the customer. During this initial start-up and commissioning, all tasks carried out by the MHM service engineer or the technicians of an authorized dealer are recorded.



NOTE

Any defects or complaints must be brought to the attention of the authorized technician, documented in writing and recorded immediately on the service technician's installation/jobsheet.

This installation/job sheet must be clearly signed by both parties, stating the date and location of the Synchroprint and will be legally binding hereon after.

## 7. Design and Operation

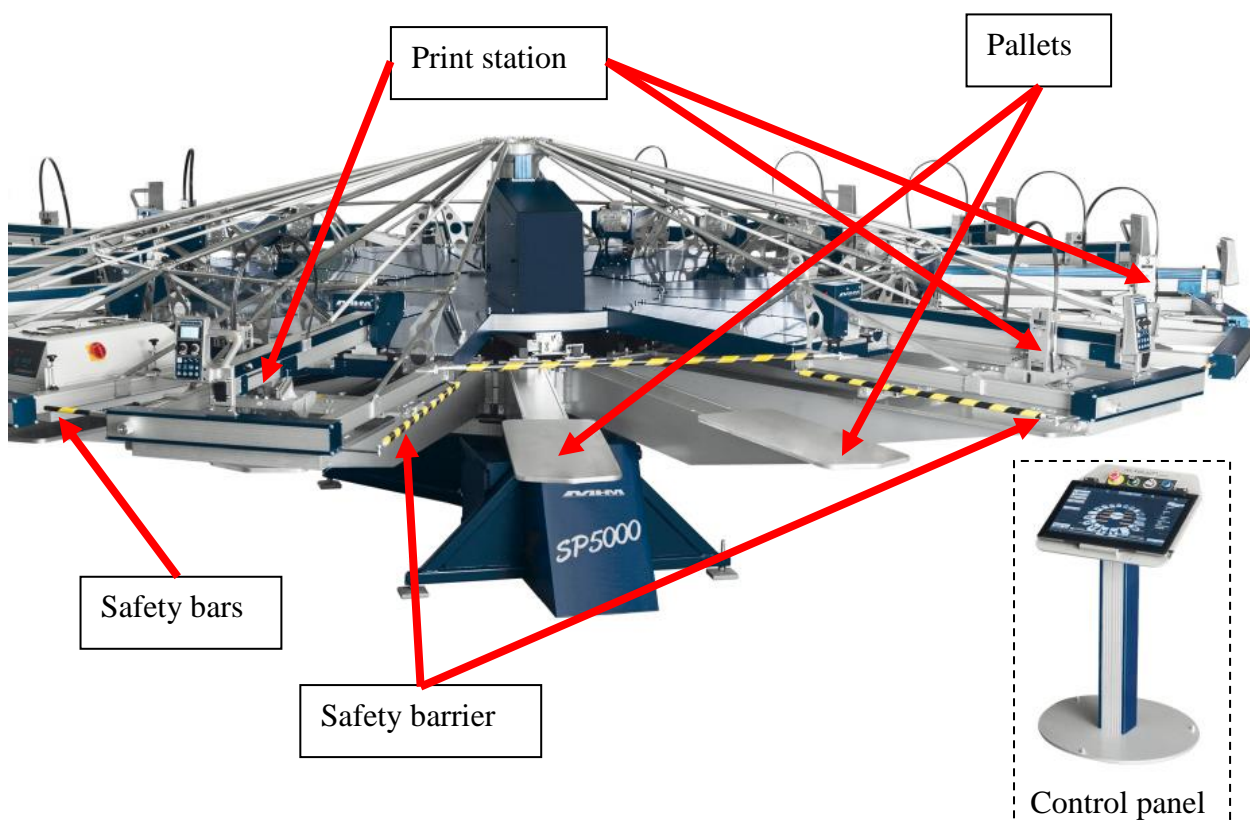
This section describes design and operation and indicates the individual assemblies.

### 7.1. General Process Description

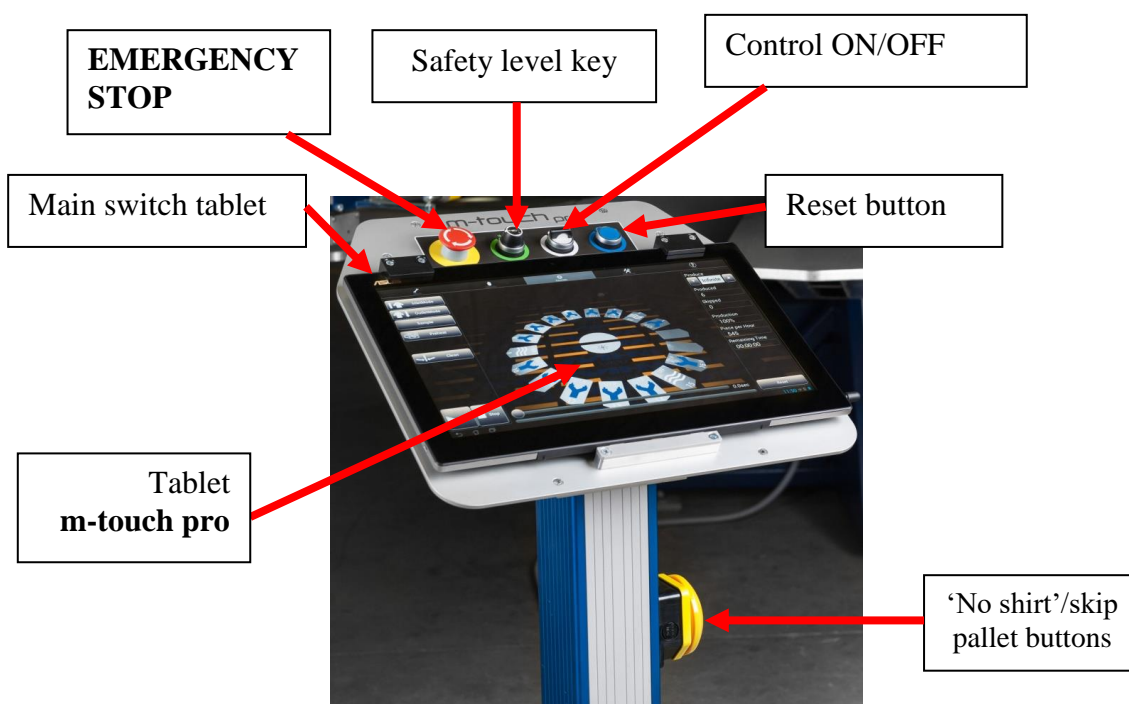
The operator applies a substrate (usually a T-shirt or paper) to the pallets at the locating surface. Textiles will be fixed in position by means of the spray adhesive applied to the pallets beforehand. For paper a special vacuum model is necessary to hold the substrate on the pallet by means of negative pressure. Subsequently, the carousel moves the substrate to the first print station, where the substrate is printed by means of screen printing or treated with optional accessories. Subsequently, the substrate moves to the second station, where it is treated again, before the process continues with all other stations. Finally, the substrate arrives at the unloading point, where an operator takes it from the machine for further processing.



## 7.2. Overview Machine Parts



## 7.3. Control panel



The control panel includes the following features:

Machine feature	Description
Tablet <b>m-touch pro</b>	The tablet PC is used to control the main operating features of the Synchroprint. Touching (tapping) the command buttons displayed on the screen will operate various individual functions of the machine. You will find a detailed description of all the functions in section 9 Control of the Machine.
Main switch tablet	Use “Main switch tablet” to switch the tablet on, off or to put it into idle state. When the unit is on, push shortly to change into idle state. After a longer push a menu will be displayed where the unit can be switched off completely. To start the tablet a short push is enough. The handling is similar to modern Smartphones.
Control ON/OFF	“Control ON/OFF” is used to switch the control power supply which supplies all control components including the tablet. To switch off the main power use the main power switch.
EMERGENCY STOP (push button)	The EMERGENCY STOP push button is part of the safety facility. See section 7.4. Safety Devices.
‘No shirt’/skip pallet buttons	Press the Skip-Button when substrate is not applied in a correct way. In this case the respective print station will not start to work and the substrate will not be printed. The print process at other stations and pallets will not be interrupted.
Safety level key	In operating mode ADJUST an automatic error resetting can be activated; this is needed for adjusting the machine. This can be done by switching the safety level key to 1-position, in normal operation the key must be on 0-position. Only properly trained and suitably qualified personnel should use this function. The quick stop function of the turn table is active all the time. Print and Flood strokes can also be made at active error situations. Active error resetting is displayed with the safety level signal lamp.

## 7.4. Safety Devices

The safety devices serve as emergency stop facilities to avoid accidents and to guarantee safe operation of the machine. The Synchroprint has the following safety devices:

Safety device	Description
EMERGENCY STOP (push button)	Push button located at the main control panel. In case of emergency, pressing the EMERGENCY STOP will stop all movements of the machine. The function of the push button is cancelled by unlocking the switch (turning it to the right).
Safety bars	Yellow/black bars located at the right and the left of the ‘load/unload’ area. Pressing any one of these bars will result in an immediate EMERGENCY STOP of the machine. The location of these bars ensures that the EMERGENCY STOP function is activated automatically should a person become trapped between print station and pallet.
Safety barrier	Yellow/black barriers located between the print stations which serve to cordon off the danger zone. As soon as they are opened by a person passing through, an immediate EMERGENCY STOP is activated.



CAUTION

These safety devices must not be used to switch off the machine under normal operation. Any EMERGENCY STOP presents an exceptional loading to the servo-motor and transmission etc. Excessive use will result in damage to the machine along with subsequent cancellation of the warranty.

## 7.5. Pallets

The substrates must be applied on the pallets. Depending on the substrate size, different pallets must be used. By default pallets with format 52x100cm or 75x120cm made of aluminum in honeycomb structure and a thickness of 17mm are used. The maximum allowed pallet weight is 10kg.



CAUTION

Exceeding the maximum allowed weight of the pallets would increase the dynamic load to the machine and can cause material damage. The maximum weight of the pallets must be observed.



NOTE

Only pallets provided by MHM must be used for production.

## 7.6. Foot switch

The foot switch is used to start an index movement when machine runs in manual mode. In automatic mode the index movement can be blocked.

## 7.7. Type Plate

The type plate with type, serial number, year of manufacture, mains voltage, mains frequency, connected load and CE symbol is located on the left side of the machine base.

## 7.8. Main Power Switch

The main power switch is mounted at the machine's basic frame. It disconnects the machine from the main supply voltage immediately.

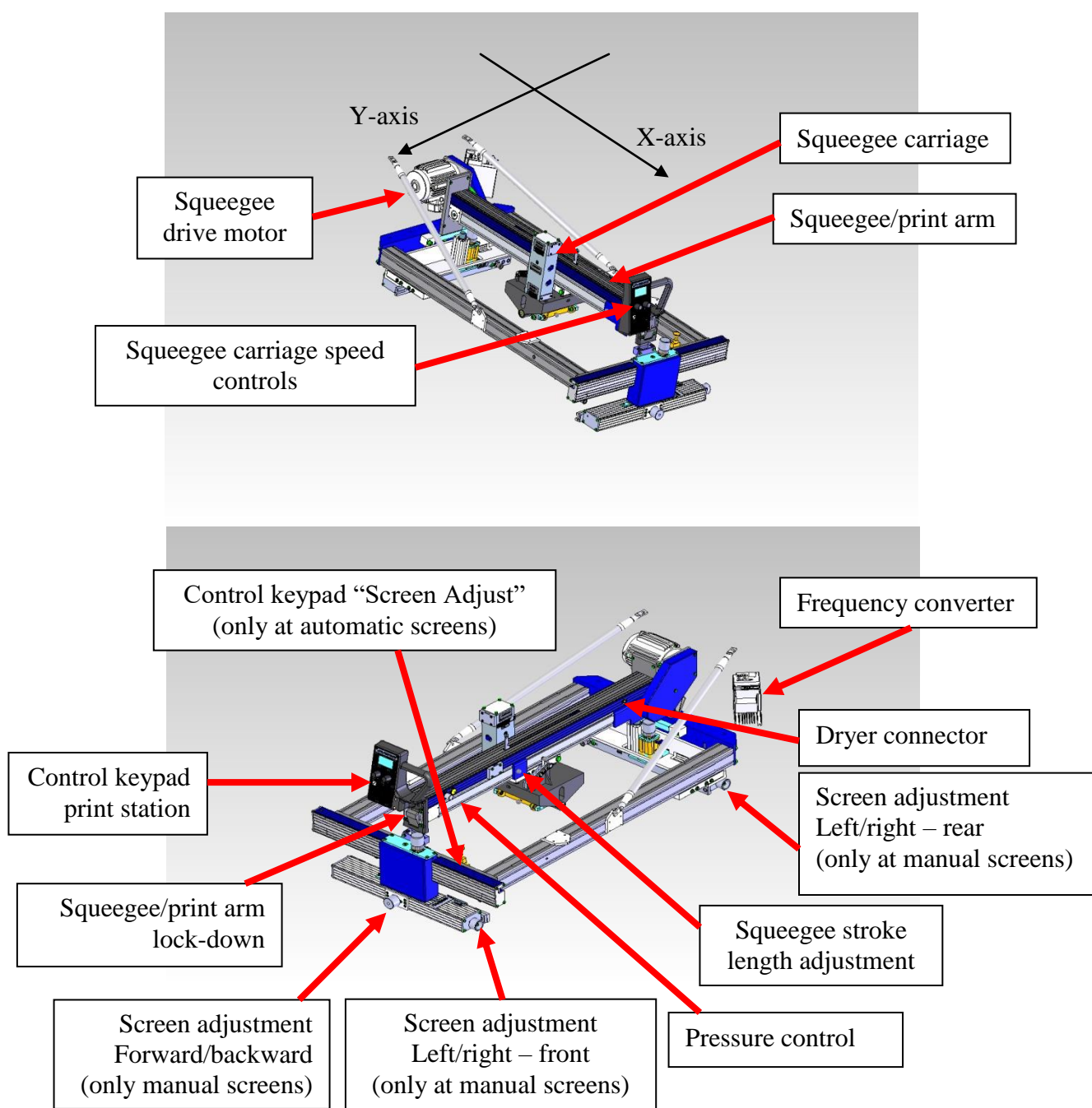
## 7.9. Print Stations

The print stations are used for printing individual colours on to textiles/garments. The Synchroprint may be ordered with a maximum of up to 18 print stations. Two different types of print stations are possible:

- Manual Version: The screen positioning is manually made by hand wheel.
- Automatic Version: The screen positioning is made automatic by stepping motors. Different positions can be saved and reloaded.

The following sections include a detailed description of the individual components.

### 7.9.1. Overview Manual Print Stations



### 7.9.2. Squeegee Arm Motor

The squeegee/print arm motor is used to drive the squeegee carriage back and forth, controlled precisely by the frequency converter.

### 7.9.3. Frequency Converter

The frequency converter controls the squeegee drive motor. The motor and frequency converter have already been adjusted by MHM, and no further adjustment should be necessary.

### 7.9.4. Squeegee/print arm

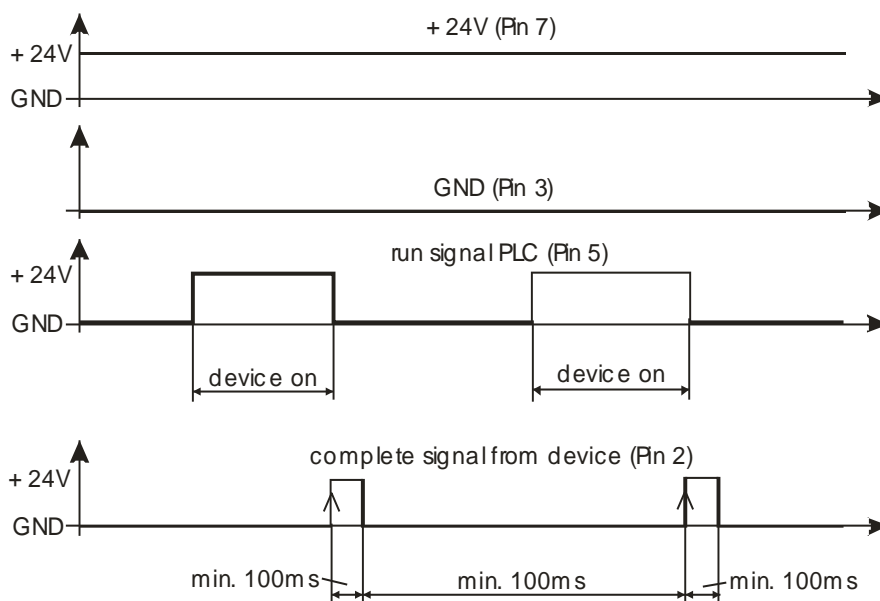
The squeegee carriage, squeegee stroke length adjustment, the control keypad and the pressure control are all located on the squeegee arm.

### 7.9.5. Dryer connector

The dryer connector is used to control external units like intermediate dryers or flock units. To start the unit a 24V Signal is set on Pin 5. The duration of drying can be controlled internal by the machine or external by the external unit. At external control a complete signal must be set at Pin 2 when the unit has finished. The system is detecting the positive edge of the complete signal. A continuous complete signal will not work.

The following pin assignment is given:

- Pin 2: IN ready signal
- Pin 3: GND
- Pin 5: OUT run/start signal
- Pin 6: Auto detect
- Pin 7: +24V



#### 7.9.6. Screen Adjustment/Micro-Registration (only at manual screens)

The screen adjustment/micro-registration is used for the precise positioning of the screens. Each screen may be positioned forwards/backwards by means of a single hand wheel adjuster located at the front of each individual print station. For left/right adjustment there are two hand wheel adjusters located at the front and rear of each individual print station. Adjustment is free from play and self-locking, therefore no additional clamping is required.

#### 7.9.7. Squeegee stroke length adjustment

The squeegee stroke length adjustment may be used to adjust the precise travel of the squeegee carriage. There are individual sensors on each print station to adjust the front and rear positions. Minimising the travel of the squeegee carriage helps to reduce printing times and increase production.

#### 7.9.8. Squeegee/print arm lock-down

Pressing the squeegee/print arm lock raises the entire squeegee/print upwards, providing unobstructed access to the screens.

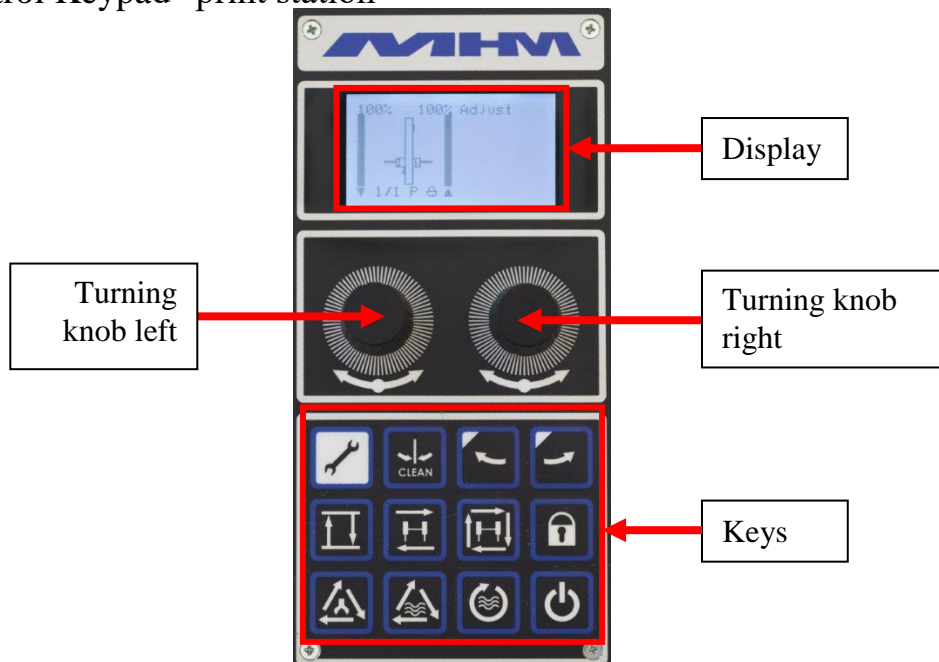
#### 7.9.9. Pressure control

Squeegee pressure adjustment (with clear display gauge).






















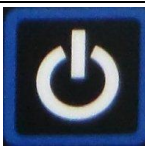
### 7.9.10. Control Keypad “print station”



The control keypad is used to operate various functions without having to return to the main control panel. Control of the machine through the control keypad is only possible when in ADJUST-mode.

The following functions are available from the control keypad:

Key	Function
	Pressing and holding “ADJUST” on the keypad (approx. 3 sec.) puts the machine in the ADJUST-mode.
	Pressing CLEAN initiates a “half-index” of the tables, particularly useful for cleaning the screens. In clean position it is possible to move the tables manually. Pressing CLEAN again moves the tables back to its original position even when tables were moved manually.
 + 	Pressing the “ADJUST” and the “INDEX LEFT” keys simultaneously will move the tables one position/index to the left.
 + 	Pressing the “ADJUST” and the “INDEX RIGHT” keys simultaneously will move the tables one position/index to the right.
	The “RAISE/LOWER” key raises or lowers the screen depending on its initial position.



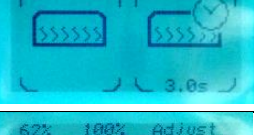
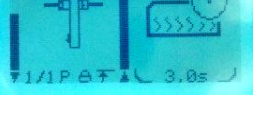
Key	Function
	Pressing the “SQUEEGEE CARRIAGE MOVEMENT” key moves the squeegee carriage once, either forwards or backwards depending on its initial position..
	Pressing the “PRINT CYCLE” key starts one complete cycle of the respective print station. ( <i>e.g. flood/machine lower/print/machine raise</i> )
	The “LOCK” key is used to lock/unlock the screen pneumatically.
	“PRINT ADJUST” changes the function of the station among print station, dryer and OFF.
	With “DRYER ADJUST” the following empty station will be activated as dryer station or disabled.
	Pressing “DRYER CYCLE” starts a dryer cycle on the following empty station.
	“ON/OFF” disables the complete keypad with all his functions.
 + 	Press “ADJUST” and turn left or right turning knob simultaneously to adjust number of flood- and print-strokes at the print cycle.
 + 	“ADJUST” and “ON/OFF” lifts station when optional station lifting is installed. Pressing any key of the lifted station will lower the station again.

Using the two turning knobs allows the following settings:

- Turning the left knob adjusts the squeegee carriage speed inwards, the right turning knob the speed outwards.
- To change the adjusted dryer time press the turning knob and turn it simultaneously. The left turning knob adjusts the print station, the right turning knob the empty station to the right. When a drying time of zero is adjusted, the function changes to external ready signal.



The display shows the actual setting of the print station on the left and the next empty station on the right. Any combination of the below pictures is possible.

Display	Description
	Keypad is disabled completely. To activate press ON/OFF.
	Left picture: Print station is disabled. Right picture: Empty station is disabled.
	Left picture: Print station is working as dryer station with external ready signal. Right picture: Empty station is working as dryer station with 3 seconds drying time.
	Left picture: Print station is active with the following settings: 62% outward speed squeegee carriage. 100% inward speed squeegee carriage 1/1 One print and one flood stroke P/W Plastisol- (first flood, then print stroke) or Waterbased-Ink (first print, then flood stroke) LOCK/UNLOCK screen fixing UP/DOWN screen position Right picture: Empty station is working as dryer station with 3 seconds drying time.

For additional settings a submenu can be called up by first pressing the right turning knob, keep it pressed and then press the left turning knob.



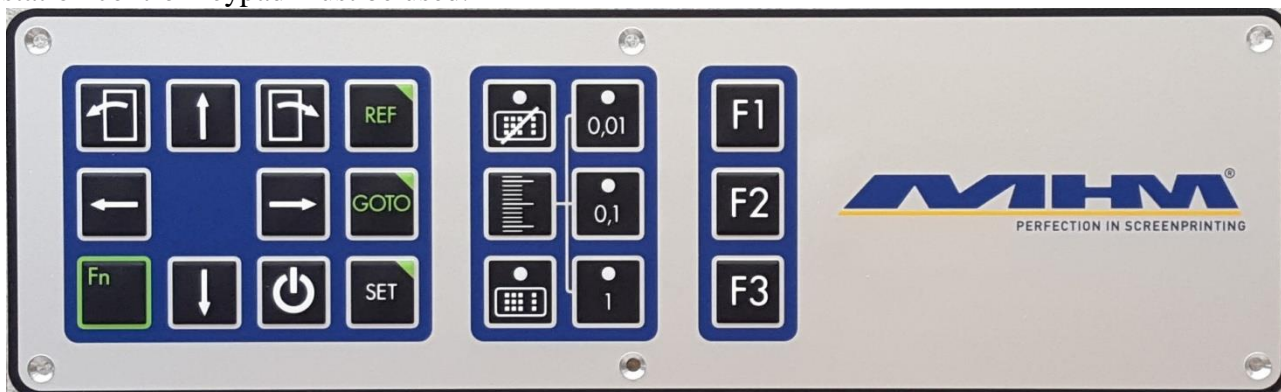
Turning the left knob changes the selected parameter. To choose parameter press the left knob, turning the right knob will change the value. Press the right knob to save the changes. Press the left knob to return to initial value. Exit submenu with button "ADJUST".

The following parameters are available:

- „Color Type“: Adjust the used ink. At Plastisol print cycle will start with flood stroke followed by a print stroke. Waterbased starts with a print stroke followed by a flood stroke.
- „Sque Delay“: Delay time for squeegee movement. Time is necessary to bring squeegee in down position before movement starts. Enter in 1/100 of a second.
- „SqueMidFront“: Switching time for outer center position. Enter in 1/100 of a second.
- „SqueMidRear“: Switching time for inner center position. Enter in 1/100 of a second.
- „LiftDelay“: Delay time for lifting or lowering the screen. Enter in 1/100 of a second.

### 7.9.11. Control keypad “Screen Adjust” (only at automatic screens)

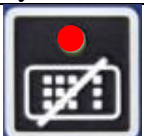








At the control keypad “Screen Adjust” it is possible to move the screens, save or load positions and to move screen to the project position automatically. To control the print functions of the station the station control keypad must be used.



Moving the screens is only possible in operating mode ADJUST, otherwise the operating is disabled.







#### Indicating lights:

The following indicating lights can be found on the control keypad “Screen Adjust”.

Symbol	Meaning
	 Control keypad is disabled. Press  to enable (only possible in operating mode ADJUST).
	 Control keypad is enabled. Press  to disable. At active screen movement the green light blinks.
	Indicator of the actual chosen travel length. Every time one of the movement buttons is pressed the screen moves the chosen travel length.  Press  to change the travel length.

### Operation:

Before it's possible to move the screen the control keypad "Screen Adjust" must be enabled as described above. The following functions are available:

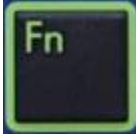

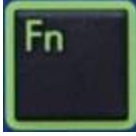


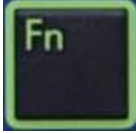

Symbol	Function
	Turns the screen counterclockwise. Only the rear Y-axis is moving.
	Turns the screen clockwise. Only the rear Y-axis is moving.
	Moves the screen to the left. Both Y-axis are moving.
	Moves the screen to the right. Both Y-axis are moving.
	Moves the screen to the rear.
	Moves the screen to the front.

### Note:

- When moving the screen lock/unlock will be controlled automatically.
- If a key is pressed multiple times the travel length will be added up.

### Project control:

Project control is only possible if the control keypad “Screen Adjust” is enabled. The following functions are available:

Symbol	Function
 + 	Moves the screen to reference- (zero-) position. The zero position is required for further functions. The reference position will only be lost in exceptional case; normally it's not necessary to make a reference drive. When reference position is missing “no Ref.” is displayed at the station.
 + 	Saves the actual screen position as project position in the actual active project.
	Moves the screen to the saved project position.
 + 	Moves all other screens to the position where the operated screen is actually (absolute motion).

### Note:

- Movement only starts when the key is pressed for at least 0.5 seconds to prevent from unwanted movement.

Display on the station terminal:

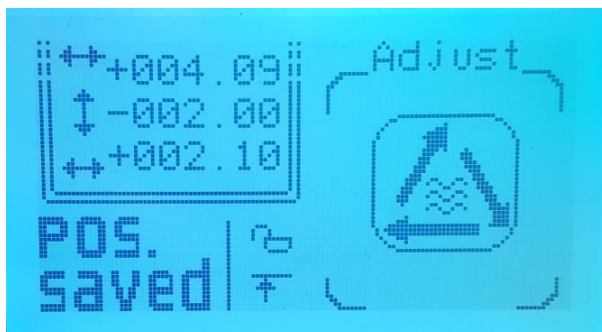
When the screen adjust keypad is enabled the actual screen position is displayed on the left side of the print station keypad:



A moving screen is indicated by an hourglass at lower left:

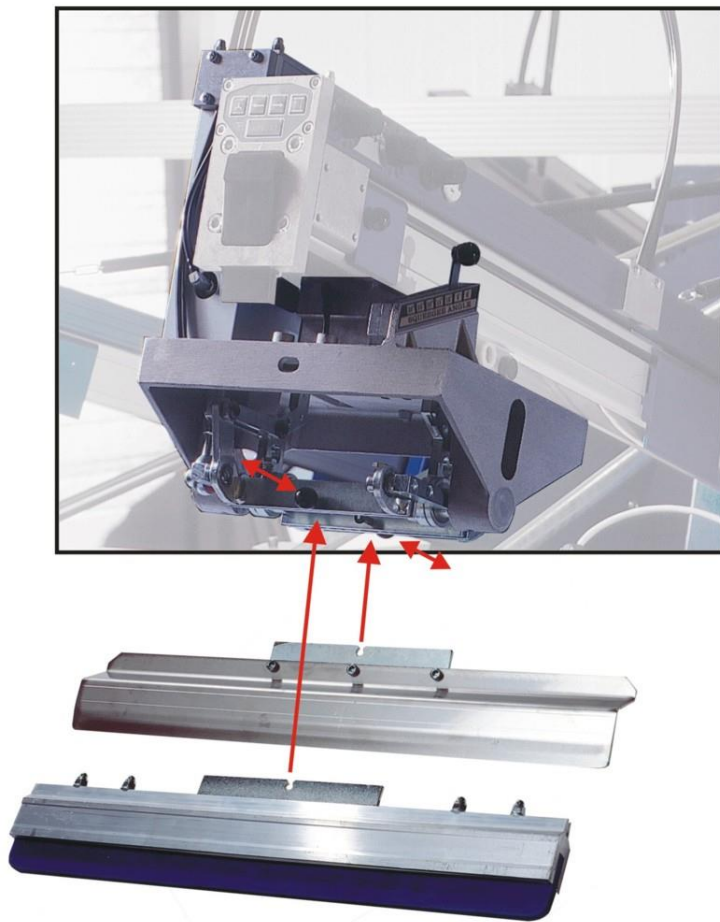


When saving the project position first the request is displayed by “req. save” and afterwards the successful saving by “pos. saved”:

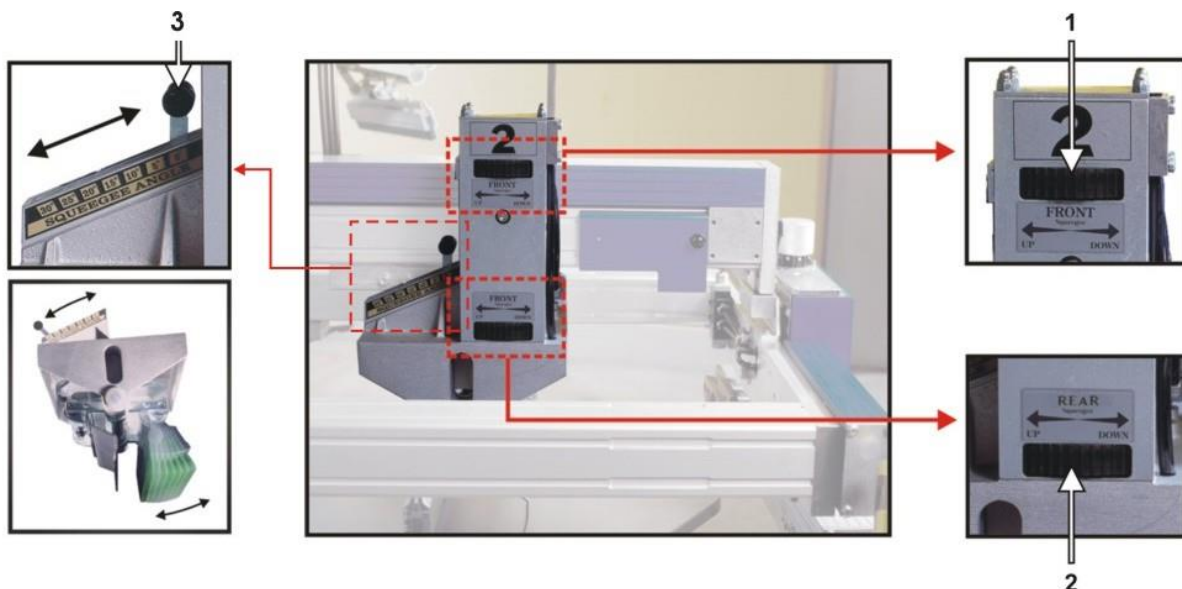




### 7.9.12. Squeegee Carriage



The squeegee carriage is equipped for two squeegees. Pulling the black 'quick release' knob (*pic. opposite*) will release the respective squeegee. Make sure that these locking knobs engage fully when loading the squeegee. The maximum permitted squeegee width must be observed.



Squeegee height may be adjusted individually by the hand wheels (*pic. 1 + 2*). Squeegee angle may also be adjusted individually by the sliding levers (*pic. 3*). Squeegee pressure may be adjusted by an adjusting knob located on the squeegee arm.

## 7.10. Additional equipment

### 7.10.1. Flash Cure Units



Flash cure units may be installed into either an empty station or a print station. The flash cure unit must be powered by a separate supply, which should comply with the electrical data supplied by the manufacturer (*see data sheet for flash cure units*). When installing into an empty station the unit is controlled through a data lead which connects to a socket located at the rear of the station. When installing into a print station this socket is located at the rear of the squeegee/print arm.



**CAUTION**

When connecting the flash cure unit make absolutely sure to keep the all cables away from any moving parts (especially the turntable/moving pallets etc). Failure to do so may result in damage to the cable along with serious electrical damage to the flash cure unit and machinery.

#### Procedure for the installation of a flash cure unit into a print station



**CAUTION**

Before inserting a flash cure unit into a print station the respective print station must be deactivated from the main control panel.

Move the squeegee carriage back to its furthest rear stop position before installing the flash cure unit into the print station. Subsequently, the electrical supply and data lead should be connected. An empty/blank screen frame (without mesh) should be loaded in the position of a normal screen in order to push and hold the screen holders away from the heated area to prevent any damage.



**CAUTION**

The pallets are only warranted to withstand temperatures of up to a maximum of 150° C. Exceeding this temperature will result in cancellation of the warranty for the pallets.

### 7.10.2. Flocking Devices



The high voltage of several thousand volts required for the flocking process represents a great threat for man and machine. That's why only specially qualified workers familiar with all potential risks are allowed to operate flocking devices. Before starting the machine, please read the manual of the flocking device's manufacturer and observe all safety regulations. Any noncompliance may endanger people and result in material damage to machines.

During the flocking process high voltage is used to generate a magnetic field, which aligns the flock fibers and transfers them onto the substrate. Installation and selection/control are similar to those of intermediate driers.



In case of any spark-over due to the high voltages applied, the electromagnetic interference arising from them may affect, or in extreme cases even destroy, the printing machine and other components.

Therefore, the following protective equipment is prescribed for flocking devices:

1. Optimal grounding of all machine components:  
All machine parts must be connected using adequately dimensioned cables. In addition to the earth connection via the main lead, the machine must also be connected to the building's grounding.
2. Installation of a metal drier socket.
3. Use of a signal cable with good EMC- characteristics (07-0-0-0226-0).
4. Shielding of the sensor cable through a screening braiding (30-1-1-0006-0).
5. Installation of screening plates in front of the motion trackers (02-1-6-0024-0).
6. Attenuation of drier as well as position signals in the squeegee/print arm by means of ferrites (30-1-1-0005-0, also known as suppressor chokes).
7. Shielding of the keypad (only at automatic machines, 20-0-0-0586-0).

Points 2-7 must be applied to all flocking stations as well as both adjacent stations. A set with all needed parts for one printstation can be ordered with part number 20-0-0-9160-0. Please find detailed instructions in the file "package of measures for the use of flocking devices.pdf".

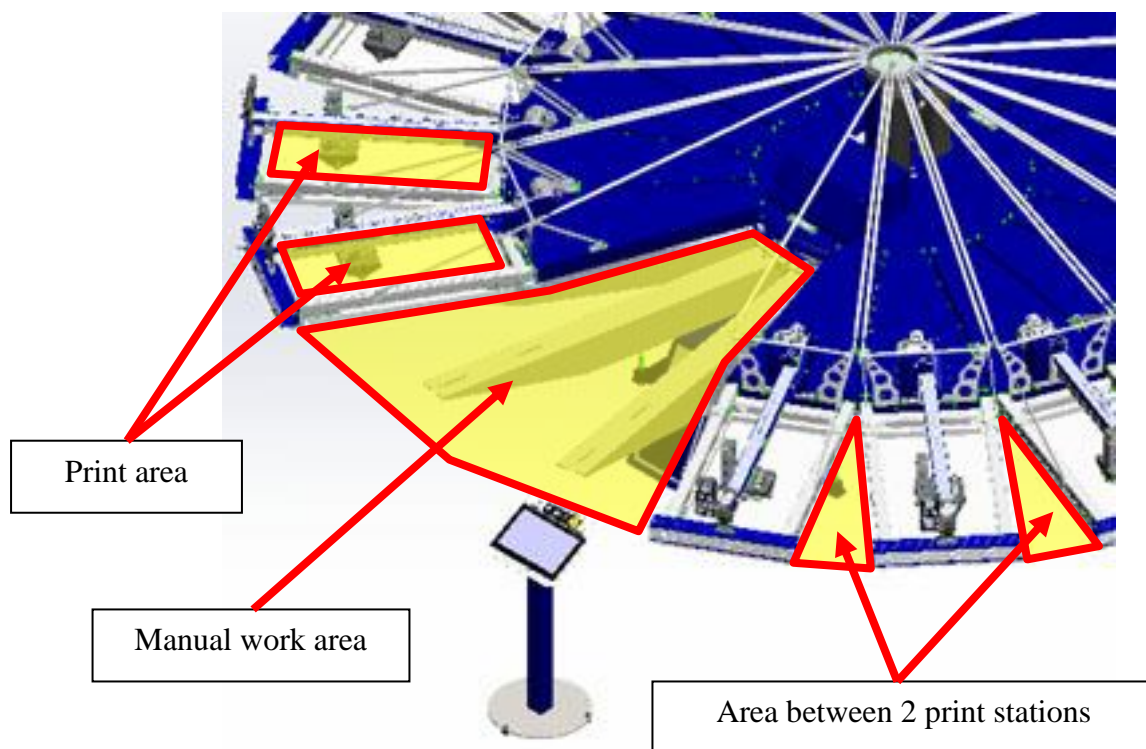


## 8. Danger Zones

Danger zones are the areas of the machine which during operation involve a certain risk for people owing to mechanical movement. This comprises all areas of the machine which involve rotary motion, clamping or other movements.

In this connection we indicate the following danger zones:

- **Manual Work Area with Locating Surface and Unloading Point**  
The manual work area is located on the left-hand side and the right-hand side of the control panel and is used for applying the substrate to the pallet as well as unloading it from the latter. When applying or unloading substrates, operators must always stand in front of and not between the pallets, in order to prevent getting caught between pallet and print station or control panel in case of a rotary motion of the carrousel (index).
- **Area between Two Print Stations**  
Access to the area between two print stations is barred by safety barriers. This area also involves the risk of getting caught between a pallet and a print station.
- **Working/Print Area**  
The working/printing area involves the risk of getting limbs jammed between the squeegee carriage and rigid mechanical parts. Do not reach into these zones during the printing movement.



If any work is to be carried out with or on the machine that requires entering or placing one's hands into any of the danger zones, one of the following conditions must be met:

1. The main control switch has been switched OFF.
2. The EMERGENCY STOP push button has been pressed.
3. One of the respective safety barriers has been pushed and engaged.

## 9. Control of the Machine

This section explains the control features of the machine from the main touch screen.



NOTE

This section illustrates the most important of the command screens, not all of which may be illustrated due to the very complex software. The command screens not illustrated in particular are those of a self explanatory nature.

### 9.1. Stopping the Machine in the event of an Emergency



DANGER

There is an **EMERGENCY STOP** push button located on the main control panel. The operating staff must be aware of its location in order to stop the machine in the event of an emergency as quickly as possible.

If the operator detects any danger to personnel or the Synchroprint, he can immediately shut down the machine by pressing the **EMERGENCY STOP** push button.

On both the left and right hand side of the load/un-load stations there are two safety bars marked yellow/black, which stop the machine immediately when actuated.

Between each print station there are safety barriers marked yellow/black. If any one of these barriers is opened the machine will stop immediately.



DANGER

When having dangerous electrical problems the main power switch must be used to disconnect the machine from the main supply voltage immediately.



CAUTION

These safety devices must not be used to switch off the machine under normal operation. Any **EMERGENCY STOP** presents an exceptional loading to the servo-motor and transmission etc. Excessive use will result in damage to the machine along with subsequent cancellation of the warranty.

## **9.2. Stopping the Machine in the event of Malfunction**

If the main control system detects any electrical or mechanical malfunction, the main drive will be disabled/de-activated automatically for the safety and protection of the operating staff.

## **9.3. Putting the Machine into Operation**

The machine is connected to the supply voltage by means of the machine's master switch. The machine control is started up with the "main control switch", a process that takes approximately 3 seconds. Subsequently, the turntable with the pallets must be moved to its reference position (initialization).

The following points must be observed:

- Prior to each start-up, any possible defects of the Synchroprint must be rectified by authorized staff.
- The start-up of the machine must only be carried out by qualified and trained personnel knowing and observing all safety instructions.
- It must absolutely be ensured that only authorized persons are permitted in the work area of the machine, and that starting the machine will not endanger anybody.
- The functioning of all safety facilities/devices must be checked.
- All tools and foreign parts must be removed from the machine prior to its start-up.
- The operators must be aware of the function and position of all safety devices/facilities.

## **9.4. Configuration of the Control**

The Synchroprint is equipped with the MHM Hybrid-Control system. This allows controlling the machine with the terminal unit when tablet "m-touch pro" is defective. At the print stations keypads with separate displays are located. Every table is equipped with an individual drive unit.

## **9.5. Hybrid-Control**

Hybrid-Control enables machine controlling either with the tablet "m-touch pro" or with the terminal. The communication between the different components is established by connected cables or Bluetooth. To change to operation by terminal disconnect the tablet and close the application with the button "Close Application" in "BasicSetup". Alternatively the tablet can be switched off completely or be transported outside of the Bluetooth transmission range.

## 9.6. Operating the machine with tablet „m-touch pro“

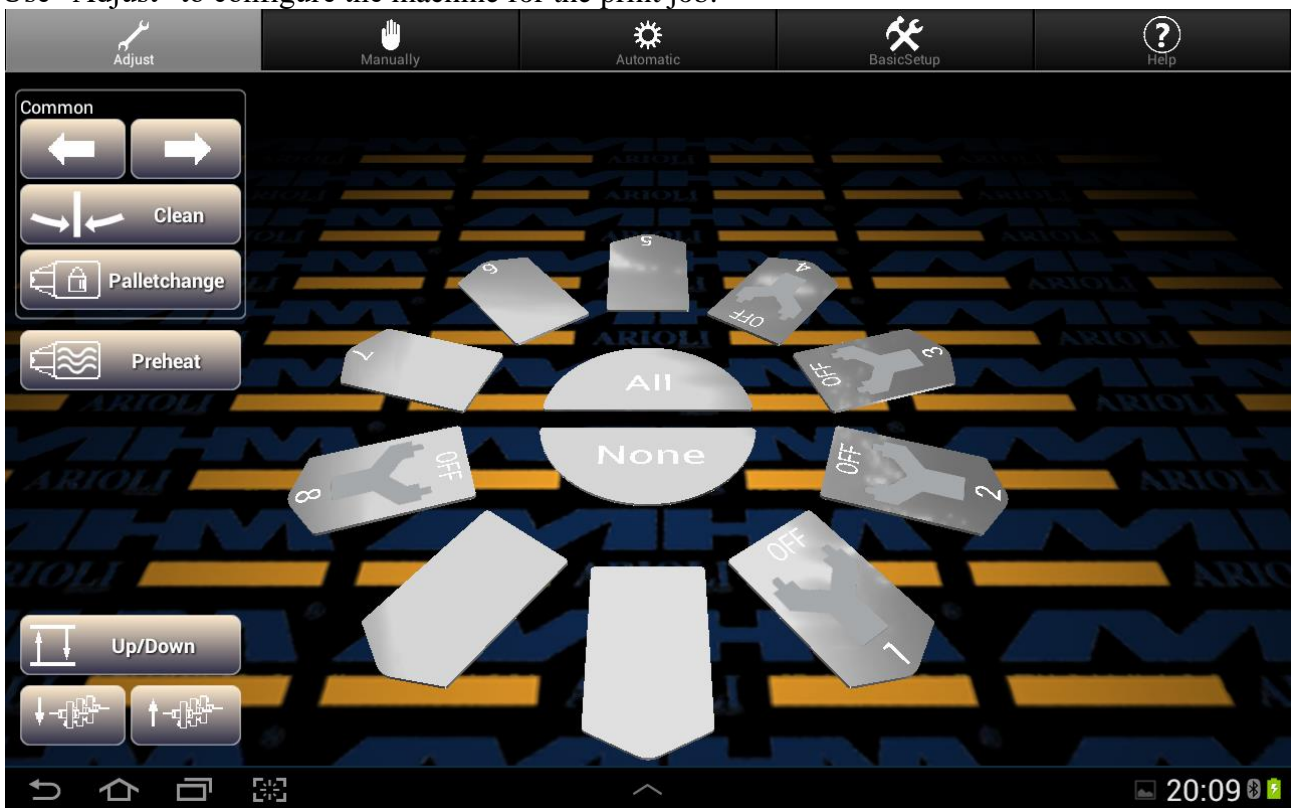
Operation is carried out by touching the displayed buttons on the tablet. To change between the menu images touch the respective area at the top of the screen. The active menu image can be identified by the grey background color. Touching the screen with two fingers and moving them up or down moves the view to the machine. Moving the fingers together or apart changes the enlargement.

Machine can be controlled by the following menu images:

- Adjust
- Manually
- Automatic
- Basic Setup
- Help








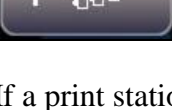
### 9.6.1. Adjust

Use “Adjust” to configure the machine for the print job.

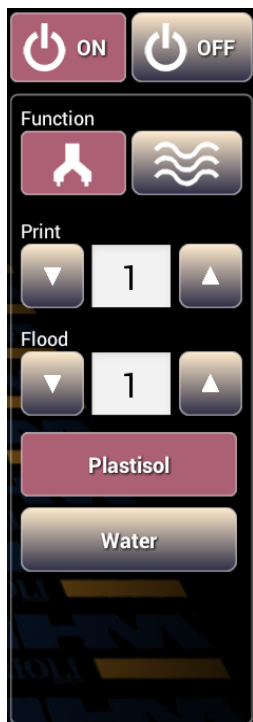


The machine setup is displayed in the center of the machine. To change the setup, first choose the affected station by touching on it and then change its configuration. The station can be deselected by touching it again. It is possible to select more than one stations, active stations are displayed in red color. Possible settings for chosen stations are displayed on the right side of the Image. Using the buttons ALL and NONE quickly selects all stations or no station.

The following control panels are available:

Button	Functional description
	Indexes/moves the tables to the next print station on the left.
	Indexes/moves the tables to the next print station on the right.
 Clean	Moves the tables to the clean/half index position.
 Palletchange	Allows the operator to lock or release the pallets.
	Raises or lowers the screens to off-contact position.
	Lock and Unlock the screens pneumatically.
	Moves all squeegees to the outer position.
	Moves all squeegees to the inner position.

If a print station is selected the following control panels is displayed.



“On” activates a station, appending parameters are displayed.  
“Off” deactivates a station.

Determines if the station is used as a print or a dryer station. Appending parameters are displayed when print station is selected.

Determines the number of print strokes at a print cycle.

Determines the number of flood strokes at a print cycle.

Select this when Plastisol-ink is used. Print cycle starts with a flood stroke followed by the print stroke.

Select this when Waterbased-ink is used. Print cycle starts with a print stroke followed by the flood stroke to prevent screen from drying up.

A connected dryer will be detected automatically or can be chosen manually. For dryers the following control panel is displayed.



“On” activates a station, appending parameters are displayed.  
“Off” deactivates a station.

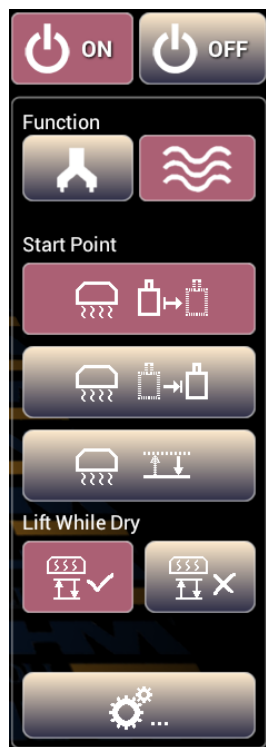
A dryer was detected or manually chosen. Appending parameters are displayed.

Determines the drying time. When time is set to 0, drying mode switches from internal to external automatically.

“Intern”: Drying time is controlled by the machine. Enter time in the field above.

“Extern”: Drying time is controlled by the dryer. Machine waits for a ready signal sent by the dryer.

Switches to the following control panel.



“On” activates a station, appending parameters are displayed.  
“Off” deactivates a station.

A dryer was detected or manually chosen. Appending parameters are displayed.

Drying starts at the beginning of an index.

Drying starts at the end of an index.

Drying starts after the machine has lowered to off-contact position.

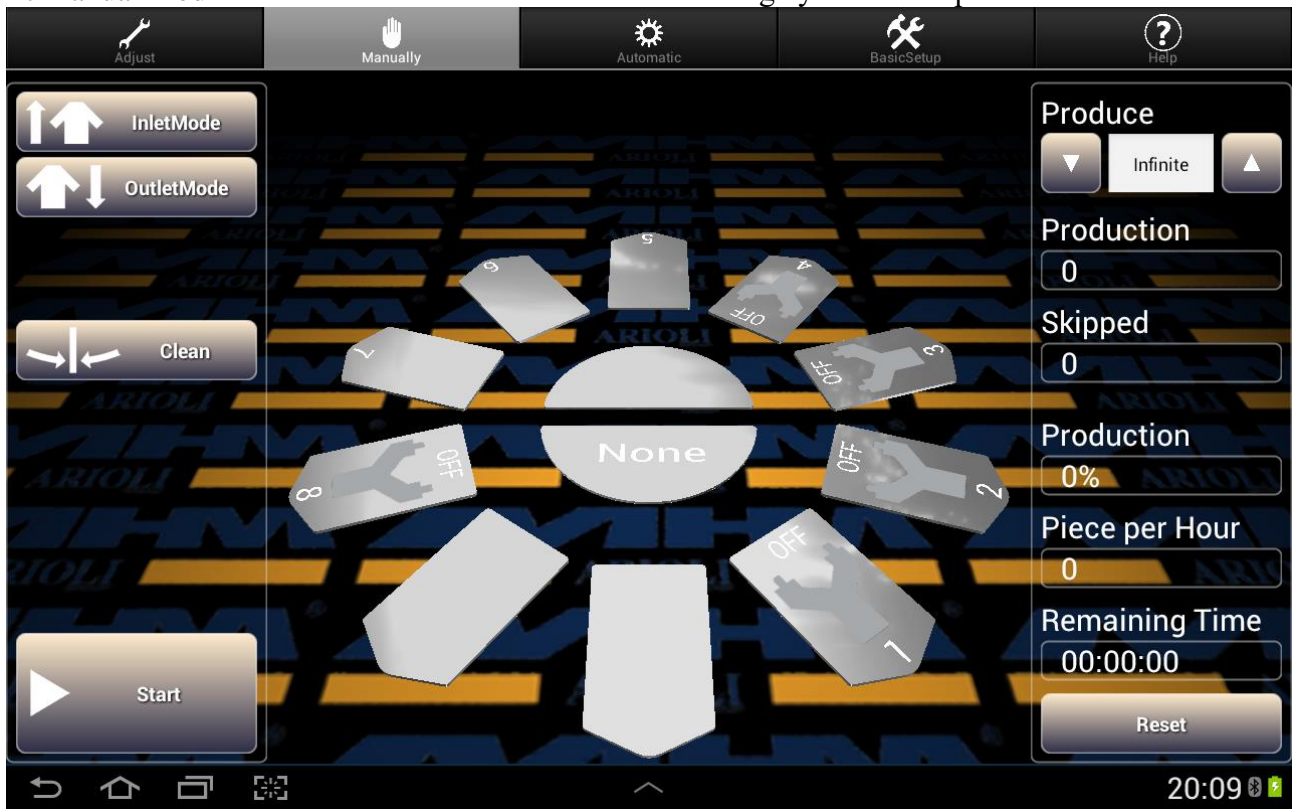
Enables or disables lifting screen during drying.

Switches to previous control panel.








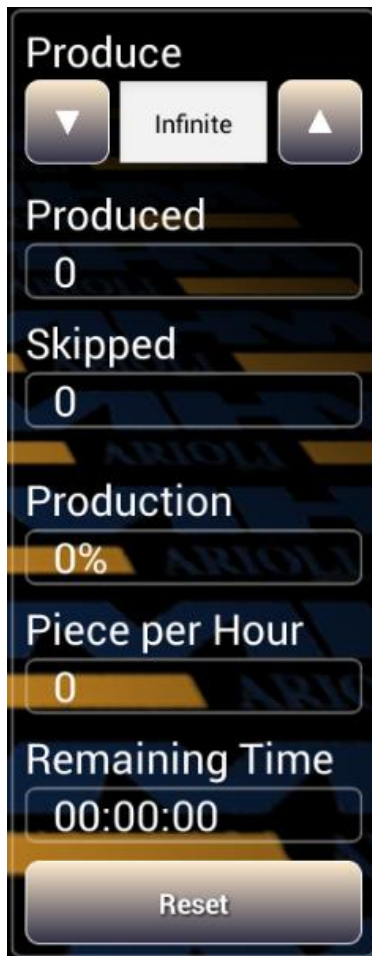
### 9.6.2. Manually

At Manual-mode with button “Start” one index and working cycle will be processed.



The following buttons are displayed:

Button	Functional description
 InletMode	Is used for the sequential start of a new print job/run. It activates each selected print station/flash cure unit in sequence when commencing a production run. After the first complete printing cycle with all enabled print stations/flash cure units, the startup mode will be turned off automatically.
 OutletMode	Is used to switch off the print stations one by one when print job is finished.
 Preheat	Warming up the pallets to working temperature. For this only active drying stations are used. Warming up is necessary to get the same print results from the beginning.
 Clean	Moves the tables to the clean/half index position.
 Start	Start a print cycle including index. An optional foot switch provides the same function, only the first start command must always be given at the control panel.



Determines the desired quantity of the production job. The value can be changed with the up and down arrows or by direct number input after touching the field

Displays the number of items which have been produced since the last "RESET".

Displays the amount of skipped tables since the last reset.

Displays status of the actual job in percentage.

Displays the hourly output of the machine at actual speed.

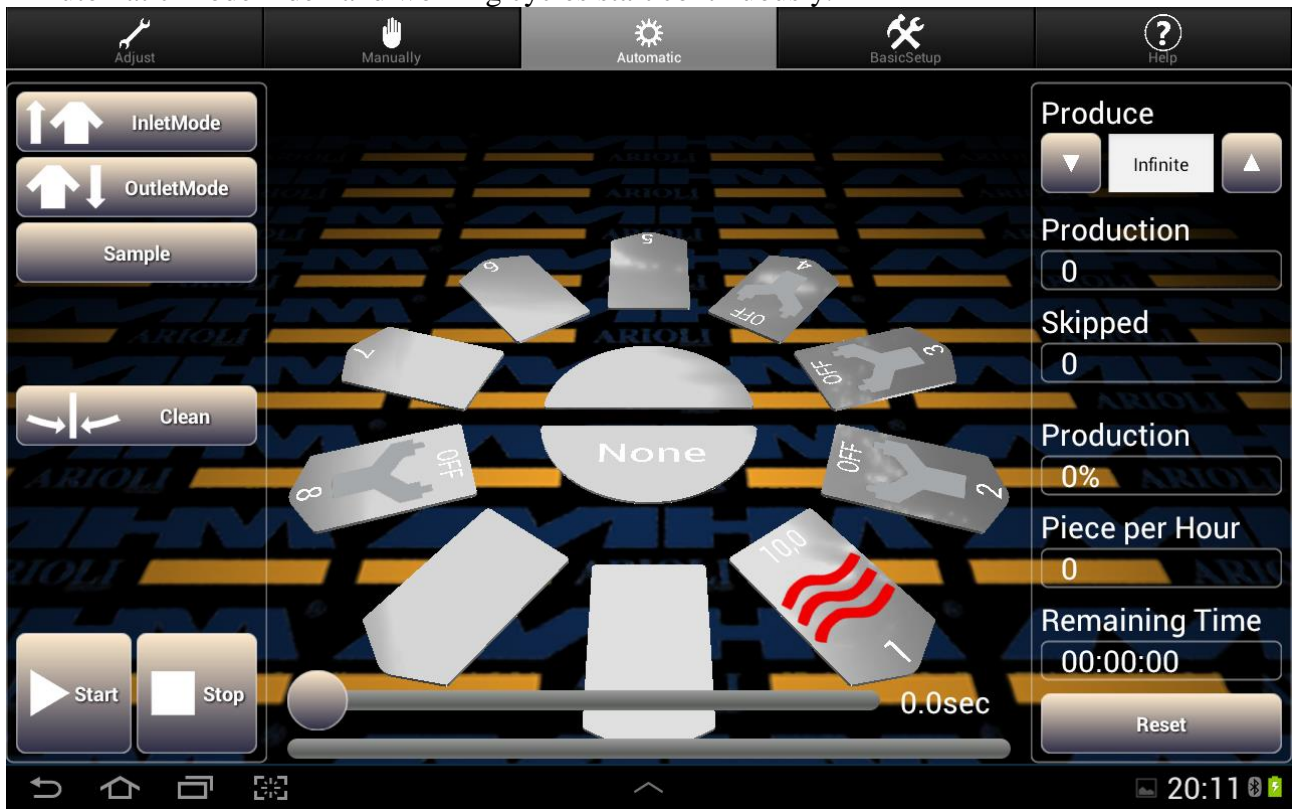
Estimated remaining time for actual print job at actual speed.

Clear the counters "Produced" and "Skipped".









### 9.6.3. Automatic

In Automatic-mode index and working cycles start continuously.

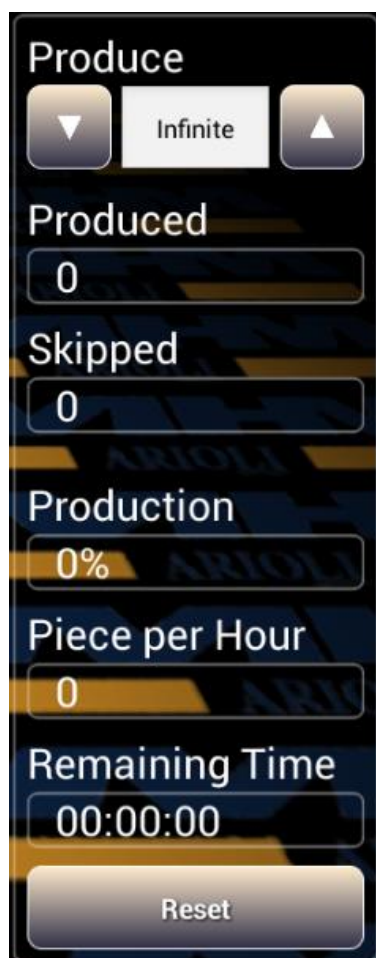


The following buttons are displayed:

Button	Functional description
 InletMode	Is used for the sequential start of a new print job/run. It activates each selected print station/flash cure unit in sequence when commencing a production run. After the first complete printing cycle with all enabled print stations/flash cure units, the startup mode will be turned off automatically.
 OutletMode	Is used to switch off the print stations one by one when print job is finished.
Sample	Starts a sample print. The desired amount can be increased by pressing the button "Sample" more often. The actual adjusted amount is displayed at "Produce". The sample will automatically perform the required inlet and outlet mode, the manual adjustment is not necessary.
 Preheat	Warming up the pallets to working temperature. For this only active drying stations are used. Warming up is necessary to get the same print results from the beginning.

Button	Functional description
 Clean	Moves the tables into the clean/half index position.
 Start	Starts the automatic production. When a working cycle is finished the next index move starts automatically. An optional foot switch can be used to pause before next index move.
 Stop	Interrupts the running print job after the actual working cycle.

The slider delays the next index move. This can be used to give operators more time to do their work. Shift the round button to the left or right to change the desired time. The actual adjusted delay time is displayed on the right.



Determines the desired quantity of the production job. The value can be changed with the up and down arrows or by direct number input after touching the field

Displays the number of items which have been produced since the last "RESET".

Displays the amount of skipped tables since the last reset.

Displays status of the actual job in percentage.

Displays the hourly output of the machine at actual speed.


Estimated remaining time for actual print job at actual speed.

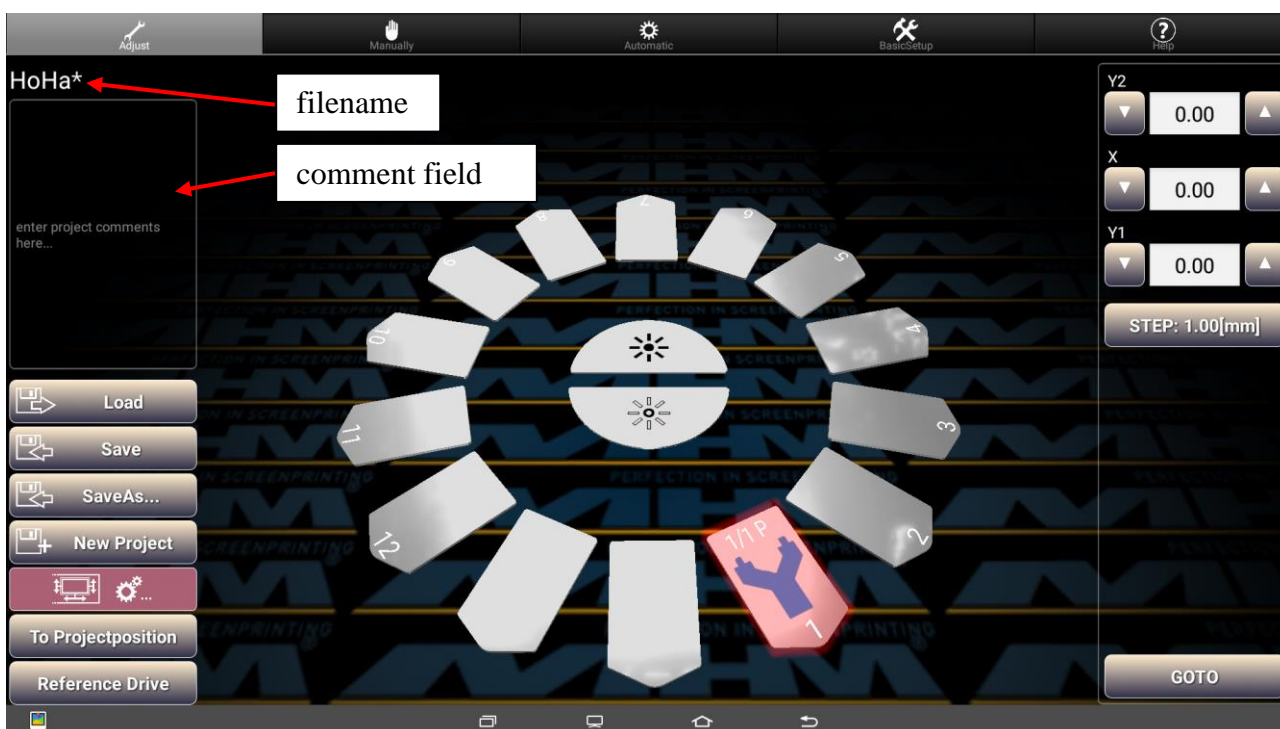
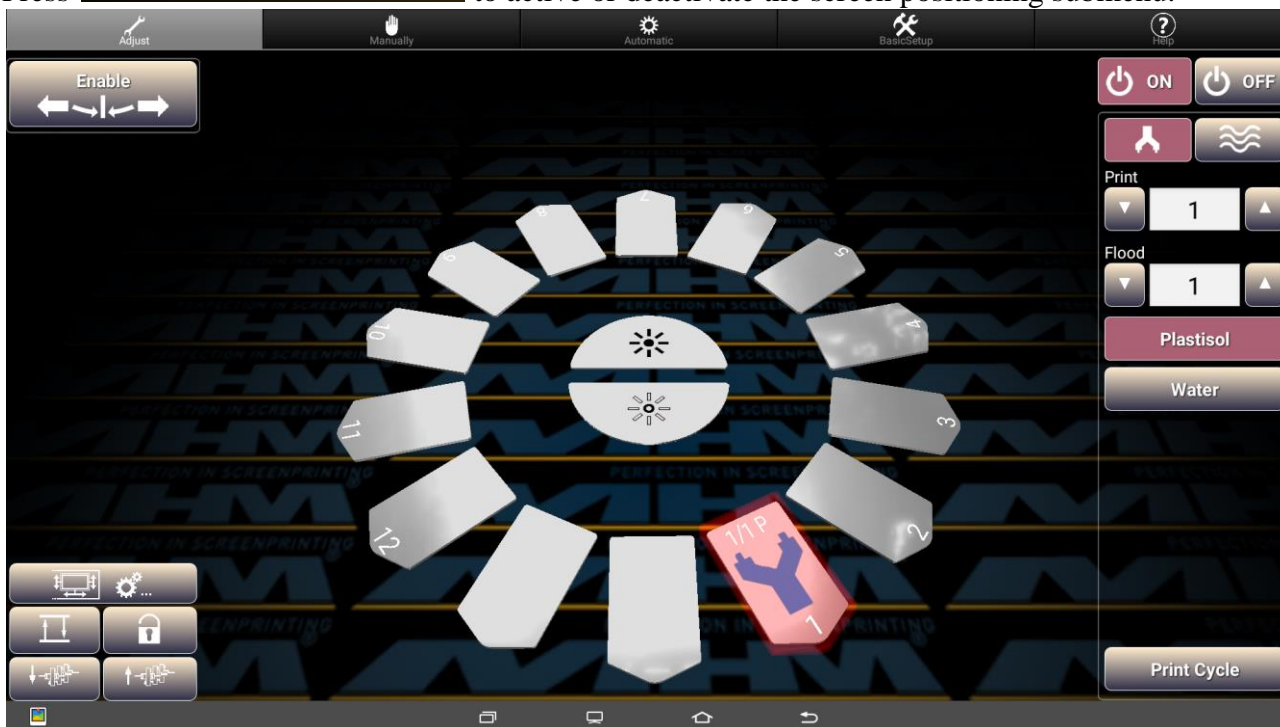
Clear the counters "Produced" and "Skipped".

#### 9.6.4. Screen positioning at automatic machines

All screen positioning functions including project administration are only accessible at operating mode ADJUST. In operating mode MANUAL or AUTOMATIC only the GOTO function is enabled.







Press  to active or deactivate the screen positioning submenu.



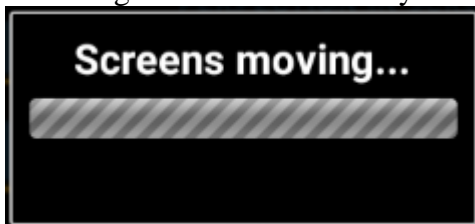
### Project administration:

The project administration buttons can be found on the left side. The actual active file is displayed on the top left. A star after the filename indicates that the screen had been moved from the project position (see screenshot above). Below the filename a comment with additional information can be added (information will be saved). For project administration the following buttons are available:

Button	Function
 <b>Load</b>	Loads a previous saved file. When project position changes you will be asked to move to the new position automatically. A crash warning will be displayed.
 <b>Save</b>	Saves the actual screen position in the project file.
 <b>SaveAs...</b>	Saves the actual screen position in a new or other not active file.
 <b>New Project</b>	Creates a new project file and opens it automatically.
<b>To Projectposition</b>	Moves all selected screens to the project position.
<b>Reference Drive</b>	Starts a reference drive at all selected stations.

### Indicators:

A moving screen is indicated by the following pop up:



When moving the screen to project position or starting a reference drive a potential risk of crash with mounted units as for example dryer exists. These units must be removed before. One of the following messages is displayed:





### File management:

When loading or saving a file the following window is displayed.

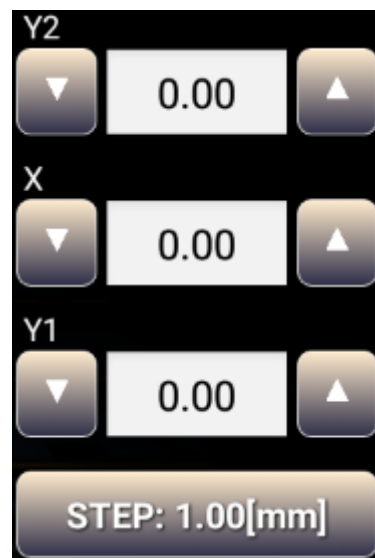


### GOTO movement:

GOTO moves the screen positions by the entered distance (relative movement; e.g. for offset correction; all screens move the same distance, the target positions can be different). Only selected stations will move, tab on station to select and deselect. A selected station is highlighted in red.

### Procedure:

1. First enter the desired travel distance at the input field on the right. You can enter the value directly by tapping on one of the fields or by using the up and down buttons. Use the STEP button to change the increments.
2. Start the movement with the GOTO Button.



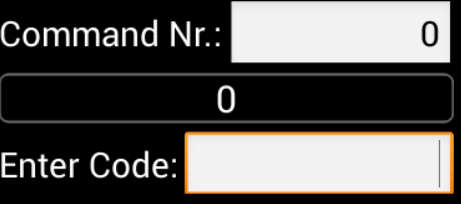



### 9.6.5. BasicSetup

Elementary adjustment must be made in “BasicSetup”.



The following buttons are displayed:

Button	Functional description
	Defines the direction of movement (clockwise or counterclockwise).
	Parameter for index speed. Input in percentage of maximum index speed. Value can be changed in 5% steps from 50% to 100%.
	„Service“-menu.
	Closes the controlling software and display start screen of the tablet.

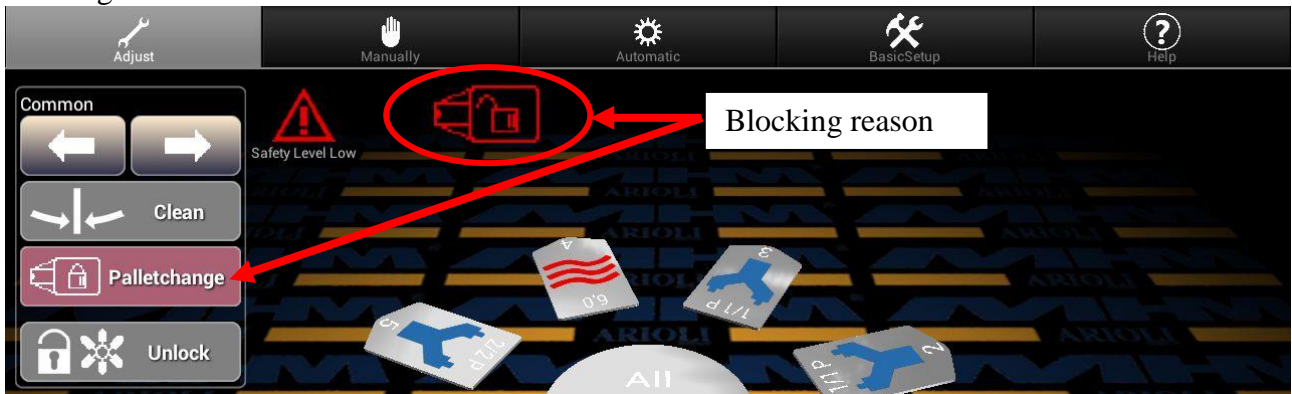


### 9.6.6. Help






“Help” supports you at troubleshooting and controlling the machine.

## 9.7. Blocked operation

In several working positions operation will be blocked automatically. The reason for blocking will be displayed by a symbol or pressed buttons on the tablet. To operate the machine again the blocking reason must be eliminated.



The following reasons block machine operation:

Label	Symbol or button	Description / trouble-shooting
Tablet not connected.		The tablet is not connected to machine control.
Palletchange	 + 	Palletchange function is active.
Clean		Tables are on clean position.
Unlock screens		Screens are unlocked.

## 9.8. Operating the machine with the terminal

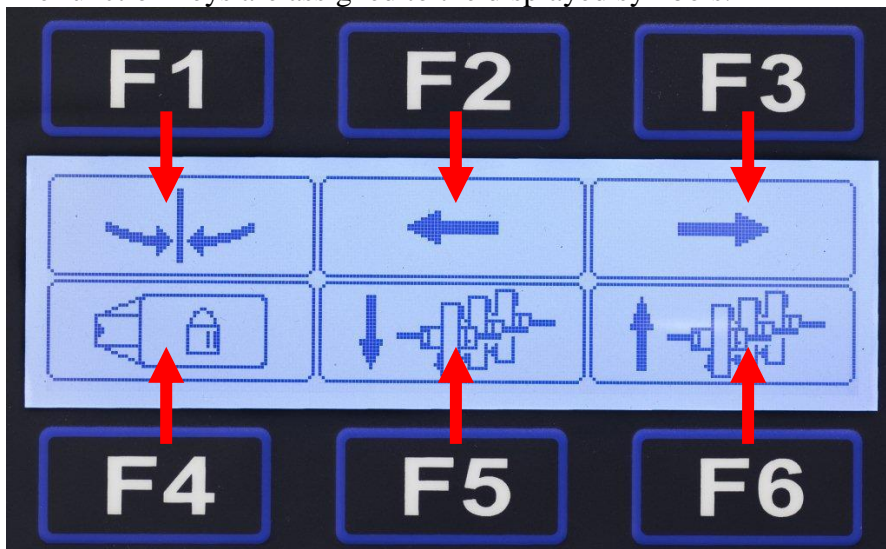


In addition to keys with a fixed function six function keys with various functions are available. The specific action of each function key will be displayed depending on actual function mode. When a function is not possible, the respective symbol will be displayed crossed out. For further adjustment two push- and turning- knobs are available.









The following function modes are available:



The function keys are assigned to the displayed symbols.



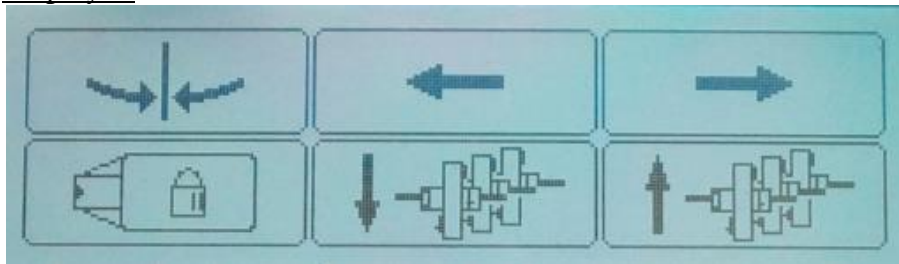
The following keys and knobs with a fixed function are available:

Key	Functional description
	INLET MODE is used for the sequential start of a new print job/run. It activates each selected print station/flash cure unit in sequence when commencing a production run. After the first complete printing cycle with all enabled print stations/flash cure units, the startup mode will be turned off automatically.
	OUTLET MODE is used to switch off the print stations one by one when print job is finished.
	SAMPLE starts a sample print. The desired amount can be increased by pressing the button "Sample" more often. The actual adjusted amount is displayed at "Produce". The sample will automatically perform the required inlet and outlet mode, the manual adjustment is not necessary.
	Pressing CLEAN initiates a "half-index" of the tables, particularly useful for cleaning the screens. In clean position it is possible to move the tables manually. Pressing CLEAN again moves the tables back to its original position even when tables were moved manually.
	Starts an index and a working cycle. In Manual-mode only one index and working cycle will be made. In Automatic-mode index and working cycles start continuously.
	Interrupts the running print job in Automatic-mode after the actual working cycle is finished.
	Turning SELECT changes the display or switches between different input fields. Push knob so select actual field.
	Turning SET changes a selected input field. Push knob to save changes.

### 9.8.1. Adjust

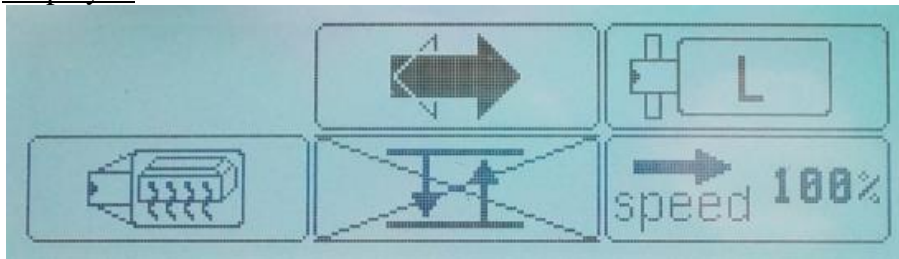
Use “Adjust” for machine setup, cleaning and adjustment. Turning the SELECT knob alternates between different displays. The following displays are possible:

Display 1:



- **F1** Moves the tables to the clean/half index position.
- **F2** Indexes/moves the tables to the next print station on the left.
- **F3** Indexes/moves the tables to the next print station on the right.
- **F4** Allows the operator to lock or release the pallets.
- **F5** Moves all squeegees to the outer position.
- **F6** Moves all squeegees to the inner position.

Display 2:



- **F2** Defines the direction of movement.
- **F3** Selects the used pallet size. Table drive parameters will be adapted automatically for highest possible production capacity. A wrong adjustment can cause disturbances or reduced production capacity. Possible pallet sizes are **Small** (50x70cm), **Medium** (70x100cm) and **Large** (80x110cm).
- **F4** Warming up the pallets to working temperature. For this only active drying stations are used. Warming up is necessary to get the same print results from the beginning.
- **F5** Not available at Synchroprint
- **F6** Parameter for index speed. Input in percentage of maximum index speed. Value can be changed in 5% steps from 50% to 100%.



Display 3:





- **F1** Starts an “Index Measurement” of the tables. This is only necessary at machine installation. Machine will detect distance between all stations for smooth movement.
- **F2** Not available at Synchroprint
- **F3** Optional function 2-Job-mode to print two separate print jobs simultaneously. More information at **Fehler! Verweisquelle konnte nicht gefunden werden.. “Fehler! rweisquelle konnte nicht gefunden werden.”**.

### 9.8.2. Manual

At Manual-mode with button “Start” one index and working cycle will be processed. An optional foot switch provides the same function as the START button, only the first start command must always be given at the control panel.

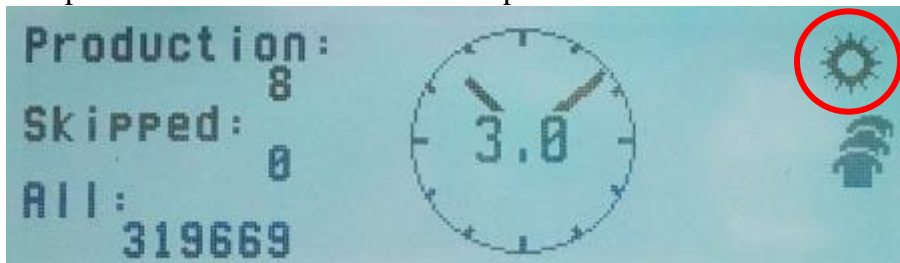


The following values will be displayed:



Display	Function
Production	Displays the number of items which have been produced since the last “RESET”. Press START button in Adjust-mode for resetting the counter.
Skipped:	Displays the amount of skipped tables since the last reset.
All	Shows the overall number of produced items.
	Delay time for working cycle to give the operators more time to do their work. Use turning knob “SET” to change the time.
	Is displayed when production is running.

### 9.8.3. Automatic

In Automatic-mode index and working cycles start continuously. Press START button to start the automatic production. When a working cycle is finished the next index move starts automatically. An optional foot switch can be used to pause before next index move.



The following values will be displayed:

Display	Function
Production	Displays the number of items which have been produced since the last “RESET”. Press START button in Adjust-mode for resetting the counter.
Skipped:	Displays the amount of skipped tables since the last reset.
All	Shows the overall number of produced items.
	Delay time for working cycle to give the operators more time to do their work. Use turning knob “SET” to change the time.
	Is displayed when production is running.

## 9.9. Error display

### 9.9.1. Error messages terminal



Error messages will be displayed in red with error number and error text.

After the error reason is eliminated the message must be cleared. An emergency shutdown must be confirmed first with the “error-reset-button” on the backside of the control panel and afterwards with “F1” on the terminal. Other messages must be confirmed two times on the terminal.



### 9.9.2. Error messages tablet

If an error is recognized by the control unit a message will be displayed on the tablet. Beside an error message you get an error description and an error number. After the error reason is eliminated the message must be cleared. An emergency shutdown must be confirmed first with the “error-reset-button” on the backside of the control panel and afterwards with the “Confirm-Button” on the tablet. Other messages must be confirmed two times on the tablet.



## 10. Trouble shooting



Before trying to locate any fault, it must be made sure that the machine may not move unintentionally. Before entering the danger zones, one of the machine’s safety facilities/devices must be actuated; in case of required work on current-carrying parts, the machine must be cut off from the supply voltage (using the main power switch).

### 10.1. Basic errors (without error message)

Error description	Possible reason	Fault clearance
Control panel does not boot up	Main power switch switched off.	Switch on main power switch!
	Power supply of machine is missing.	Is frequency converter display active? YES: Power supply existent. NO: Reestablish power supply!
	No 24V power supply at control panel.	Are the station displays on? YES: Power supply existent. NO: Fuse or ON/OFF relay defective.
	Terminal unit not connected to the Servo-PCB.	Check wiring from the terminal unit to the Servo-PCB panel (see wiring diagram)!

Error description	Possible reason	Fault clearance
Safety level cannot be adjusted.	Safety key is not connected to the Distribution- PCB.	Check wiring from the safety key to the Distribution-PCB (see wiring diagram)!
	Wrong wiring of safety key at panel housing.	Put terminal out of housing and check wiring of the safety key (see wiring diagram)!
Squeegee does not toggle at squeegee carriage movement.	Squeegee pressure too low.	Adjust pressure control at print station!
	No air pressure at print station.	Lower pressure stop cock active or tube snapped off.
	Valve not actuated.	Check wiring between station PCB and squeegee valve (see wiring diagram)!
Unlock screens does not work.	Wrong low pressure adjustment.	Check adjustment of precision pressure regulator.
	Valve not actuated.	Check wiring between station PCB, Bus-PCB and squeegee valve (see wiring diagram)!
Indexer doesn't work.	Supply cable of tablet is not connected.	Connect the supply cable with the tablet.
Booster cylinder doesn't work.	No air pressure at booster cylinder.	Wrong adjustment of lower pressure regulator or lower pressure stop cock active.

## 10.2. Error messages control system

Error-code	Error message	Error description/ troubleshooting
#0001	QUICK-STOP	Emergency stop circuit interrupted. <ul style="list-style-type: none"> <li>• Emergency stop button has been pressed.</li> <li>• Safety barrier has been opened.</li> <li>• "Control ON/OFF" is off.</li> <li>• Reset button has not been pressed.</li> </ul>
#0002	LOW PRESSURE	Air pressure too low. <ul style="list-style-type: none"> <li>• Pressure hose disconnected.</li> <li>• Pressure adjustment too low.</li> <li>• Supply pipe pressure too low.</li> </ul>
#0010	INVERTER ALERT	Error motor control. Check display of motor controller.
#1001	on Tablet: "Error & Check Station" + station number on Terminal: „warning icon + error code“	Error at Station: Dryer finish signal not received. Error-code will be displayed at the station.
#1002	on Tablet: "Error & Check Station" + station number on Terminal: „warning icon + error code“	Error at Station: Squeegee target position not reached. Error-code will be displayed at the station.

Error-code	Error message	Error description/ troubleshooting
#1003	on Tablet: "Error & Check Station" + station number on Terminal: „warning icon + error code“	Error at Station: Squeegee didn't start moving. Error-code will be displayed at the station.
#1004	on Tablet: "Error & Check Station" + station number on Terminal: „warning icon + error code“	Error at Station: Error screen lift. Check valve and reed contact. Error-code will be displayed at the station.
#1005	on Tablet: "Error & Check Station" + station number on Terminal: „warning icon + error code“	Error at Station: Foil unit finish signal not received. Error-code will be displayed at the station.
#2001	CAN Bus: Missing Station	Error at station parameter setting. Illegal gap in station addressing.
#2002	CAN Bus: Missing Terminal	Terminal not found.
#2003	CAN Bus: Station behind Terminal	Error at station parameter setting. Stations address higher then terminal address.
#2005	Inverter Communication	Communication to main drive controller interrupted. Check wiring.
#99xx	“Diverse Systemfehler” + READJUST + Fehlercode + please call MHM-Service	Please contact MHM service department for further information.
#7000	Functionality not Supported	Wrong firmware on master PCB.
#7001	Incompatible Hardware found	Update not possible because of wrong hardware
#7002	Functionality not Supported	Wrong software version on PCB
#7003	Different Software-Versions	Different software versions on PCBs
#4000	Error Position Sensors	Error position sensor signals. Check wiring.
#4001	Lift up Sensor missing	Lift up sensor signal is missing. Check adjusting, wiring and function of the sensor.
#4002	Lift down Sensor missing	Lift down sensor signal is missing. Check adjusting, wiring and function of the sensor.
#4003	Starting-Lockout	Starting lockout active. Index not possible. Check input signal.
#4004	Off contact signal out of range	Off contact position signal out of range. Check Master-PCB parameters and wiring.
#4005	Off contact drive timeout	Off contact target not reached. Check mechanics, wiring and Master-PCB setting.

## 11. Shutting Down the Synchroprint

### 11.1. Switching Off the Machine after Normal Operation

The following procedure must be observed when switching off the Synchroprint after normal operation:

- Clean all print stations.
- Shutdown the machine by using “Control ON/OFF.
- Switch off tablet with “Main switch tablet”.
- When required disconnected machine from mains by the main power switch.



If the compressed air supply is turned off (e.g. overnight), the print stations will lower or drop uncontrolled. In this case the turntable must not be moved after the shutdown in order to prevent damage to the main registration blocks/points of the machine. This would result in the cancellation of the warranty.

### 11.2. Long-term Shutdown

This refers to a scheduled long-term shutdown of the Synchroprint.

The following procedure must be followed:

- Remove all the printing screens along with the pallets.
- Lower the print stations at menu ADJUST with the button UP/DOWN.
- Switch off the compressed air supply.
- Shutdown the machine by using “Control ON/OFF.
- Switch off tablet with “Main switch tablet”.
- Disconnected machine from mains by the main power switch.
- Shutdown control unit by main control switch and wait until Touch screen switches off
- Disconnect the power supply.
- Carry out thorough cleaning of the machine.
- Carry out any necessary maintenance work.

### 11.3. Permanent Shutdown of the Machine

If the Synchroprint is to be permanently shut down or decommissioned (e.g. disposed of/scrapped), upon disassembly all individual parts must be disposed of according to their class and substance, and in accordance with any respective regulations in effect at that time in the machine's particular location/country, and by a suitably reputable and authorized waste-disposal company.

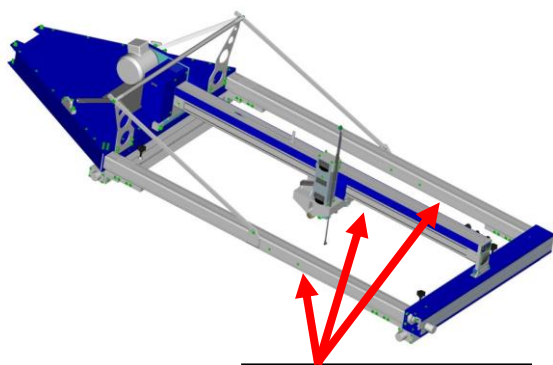
## 12. Maintenance of the Synchroprint



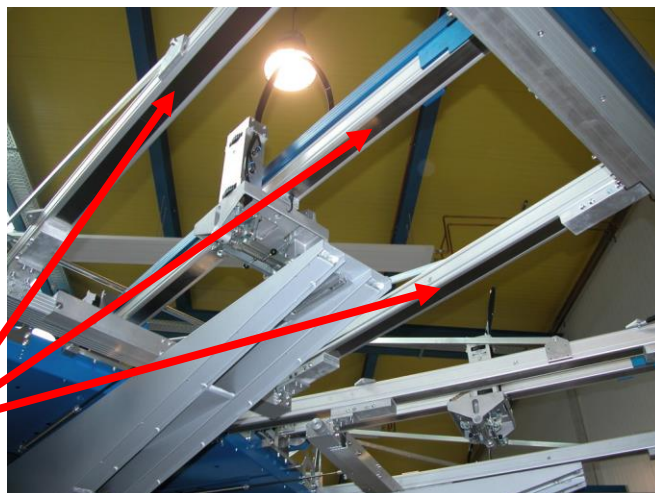
Before doing maintenance work the machine must be cut off from the supply voltage using the main power switch).

The Synchroprint has been designed to operate 'maintenance-free' as far as possible. Only a few important service measures are necessary by the operator.

Task	Frequency	Comment/Action
Daily cleaning	Daily	Remove all residues from the Synchroprint remaining from production materials such as inks and adhesives etc. Clean, tidy and sweep the printshop area.
Weekly cleaning	Weekly	Wash off all anodized parts of the Synchroprint with an appropriate cleaner. Clean all inspection glasses and displays. Clean or replace the protective foil on the touch screen.
Cleaning the touchscreen	Weekly	The surface must only be cleaned with a dry cloth or appropriate monitor-cleaning cloth. If any aggressive cleaners or solvents are applied, the surface of the touch screen will be damaged or destroyed, resulting in cancellation of the warranty. MHM recommends covering the touch screen with a self-adhesive clear protective foil, which may be applied to the actual touch screen and taken off and renewed at any time.
Wipe clean the sealing band on the underside of all the linear profiles	Weekly	The sealing band on the underside of the linear profiles must be wiped clean thoroughly and lubricated with an oil-soaked cloth.



Sealing band on the underside of the linear profiles



Task	Frequency	Comment/Action
Clean automatic relief aperture	Monthly	The entire water separator/trap is attached to the pressure regulator with a bayonet lock. Take off the water separator/trap and clean the automatic relief aperture.
Lubrication	Every 2 weeks for the first 6 months, then quarterly thereafter	<p>The machine must be lubricated via the grease nipple located on the centre shaft. MHM recommends “Berner Heavy-Duty Multi-Purpose Grease” or a comparable grease with the following technical specifications:</p> <ul style="list-style-type: none"> <li>▪ Water-repellent, lithium grease</li> <li>▪ Minimum melting point of approx. +195° C</li> <li>▪ Effective lubrication range from -20° C to +120° C</li> </ul>



**NOTE**

Clogged valve silencers cause lowered speed of pneumatic functions. In that case the silencers must be changed.



### 13. Terms of the Guarantee

The terms of the guarantee are detailed in the General Terms and Conditions of Machines Highest Mechatronic GmbH.

### 14. Limitation of liability

Warranty and liability claims for personal injury and material damage are **excluded** if they can be attributed to or are a result of one or several of the following:

- Improper use of the Synchroprint.
- Incorrect assembly, operation or maintenance of the Synchroprint by the operator.
- Operation of the machine with defective safety devices and/or safety devices which are missing/removed or not in correct working order.
- Failure to comply with the safety instructions in this document with regard to transportation, assembly, start-up, installation, operation, control and maintenance of the Synchroprint.
- Failure to comply with the Operating Instructions.
- Unauthorised modifications to the Synchroprint (e.g. disassembly of original MHM components and/or use of any non-original MHM components)
- Unauthorised modifications to any part of the drive or control systems (e.g. change of control components or frequency converters).
- Lack of monitoring and maintenance of machine parts/components subject to wear and tear.
- Repair measures, maintenance or service work carried out by unauthorised persons.
- Use of lubricants other than those recommended by MHM.
- Operation of the machine under technical conditions other than those specified by MHM (e.g. excessive power supply voltage and/or excessive air pressure).
- Damage by any foreign object and/or force majeure.
- Omission of specified maintenance, service measures and procedures.
- Operation of the Synchroprint by untrained personnel.

### 15. Support, Customer Service and Hotline

In case of any problems or additional questions please turn to your appropriate service partner.