Henghui machinery
polyurethane equipment manufacturer

High-pressure Foaming Machine

Operation Manual



Zhejiang Henghui Machinery Co., LTD

Wuyi Henghui Polyurethane Equipment Factory

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1. Basic Information

In order to ensure smooth and safe operation of the metering machine (referred to in the following text as “machine”), knowledge of the basic safety instructions and regulations is required.

This operating manual contains important instructions on safe operation of the machine for its intended purpose

- This operating manual and the safety instructions in particular should be followed by all persons working on the machine.
- Furthermore, the local valid rules and regulations on accident prevention should be followed.

1.1 Operating company obligation

The operating company is obliged to permit only those persons to work on the machine, who…

- Are familiar with the basic regulations on work safety and accident prevention and who have received instructions on machine operation.
- Have read and understood the section on safety and the warnings in the operating manual and confirmed this through signature.
- The safety behaviors of the operators must be checked at regular intervals.
- The operating company must ensure that the machine operator carries the full responsibility for safety of plant and persons.
- The operating company must ensure that the operators are made aware of this responsibility and that they provide a signature of acceptance of this.
- The machine hazard area must be clearly marked through a black and yellow stripe on the floor.

1.2 Operator obligations

All persons performing work on the machine undertake the obligation prior to commencing work to …

- Observe the basic regulations on work safety and accident prevention.
- Read the section on safety and the warnings in the operating manual and confirm through signature that they understand these.
- Prior to any movement of the machine the operators must personally make sure that no objects or persons are located within the hazard or movement area.



Caution

1.3 Hazards during machine operation

Improper use of the machine can lead to risk of injury to the operators or other persons or damage to the machine or other items of value.

The specialists responsible must possess the necessary qualifications to perform the tasks involved.

The responsibility of the personnel must be clearly defined regarding：

- Transport
- Assembly
- Commissioning
- Operating
- Maintenance
- Machine controls

Under no circumstances should the controls be modified! Only properly trained personnel should be permitted to operate the control.

1.4 Use for the purpose intended

The machine is to be used only for the purpose intended and should be kept in faultless condition regarding safety features.

The machine

High-Pressure Foaming Machine

Is constructed exclusively for production operation as described in the following.:

The machine is designed for manual and automatic operation. The machine may not be moved, also in manual operation, when persons are located in the hazard area.

Any differing or further use must be considered as an infringement of the regulations. For any resulting damages Messrs. Henghui Machinery may not be made responsible.	 Caution

Use for the purpose intended also includes…

- Following all instructions of the operating manual.
- Regularly performing the inspection and maintenance work.

Arbitrary and unauthorized modifications, particularly to hydraulic, pneumatic and electrical control devices, can de-actuate safety functions.

Faults liable to impair safety should be remedied immediately.	 Caution

1.5 Constructional modifications to the machine

Without the authorization of the manufacturer…

- Make no modifications to the machine.
- Make no extension or constructional change.
- Carry out no welding work on supporting parts.
- Replace immediately machine parts that are not in faultless condition.
- Use only original spare and wearing parts.

1.6 Warranty and liability

As a principle our “General terms of sale and delivery” apply. The operating company is in possession of these at the time of contract closure at the latest.

Warranty and liability claim for damages to persons or objects are excluded if they are due to one or several of the following causes:

- Use of the machine for other purposes than that intended.
- Improper assembly, commissioning, operating and maintenance of the machine.
- Operation of the machine with defective safety devices or not properly fitted or not functional safety and protective devices.
- Failure to comply with instructions in the operating manual regarding transport, storage, commissioning, operation, maintenance and setting up of the machine.
- Arbitrary constructional modifications to the machine, especially to hydraulic, pneumatic or electrical control devices.
- Arbitrary changes in the drive ratios (e.g. outputs, speeds and cycle times).
- Insufficient monitoring of machine parts subject to wear and tear.
- Improperly performed repairs.
- Disasters due to foreign bodies and force majeure.
- Manipulation of the machine in any way.

1.7 Copyright

The copyright for this operating manual remains the property of Henghui Machinery.

This operating manual is designed for use only by the operating company and their personnel.

It contains regulations and instructions which may not be reproduced either completely or in part, or divulged or passed on in any way.

2. Safety

2.1 Organization measures

- The necessary personal protective equipment is to be provided by the operating company.
- All existing safety devices should be checked regularly.

Prior to each actuation of the machine a check must be carried out to ensure that all protective and safety devices… ● exist, ● are properly fitted and ● fully functional.	 Danger

- All safety and danger signs on the machine must be kept clearly legible.
- The operating manual should be kept at the machine location at all times.

When the machine is handed over there is always：

- 1 copy of the operating manual in the immediate vicinity of the machine.
- 1 copy should always be handed to a responsible shift foreman.
- The accident prevention regulations valid at the place of installation must be observed.

2.2 Explanation of symbols and instructions

In the operating manual the following terms and signs for danger sources are used:

This symbol means an immediate danger threat for life and health of persons. Failure to observe these instructions results in serious health damage including life threatening injuries.	 Danger
This symbol means a possibly dangerous situation. Failure to observe these instructions can result in light injuries or damage to equipment.	 Caution
Under this symbol you receive tips on application and particularly useful information. They help you to utilize optimally all functions of your machine。	
This symbol provides important instructions on proper operating of the machine. Failure to observe these instructions can lead to malfunctions on the machine or in the area.	i

2.3 Safety devices on the machine

The machine is fitted with various safety devices in order to ensure fulfilment of the statutory regulations on plant safety.

The component tanks are pressure tested A test certificate can be provided on request	1. pressure tank
The min. and max. liquid levels are monitored	2.Liquid level control
The high- and low-pressure sector is protected by return valves	3.Return valves
The tanks are fitted with a fixed setting (6 bar) and an adjustable safety valve.	4. Pressure relief valve
EMERGENCY STOP buttons are located at the control cabinet and on the control panel. When this EMERGENCY STOP button is actuated all movements of the machine involving hazard are stopped.	5. EMERGENCY STOP button

Prior to start up the machine it should be ascertained that nobody is endangered by the starting machine! The operator must be quite certain that there are no other persons within the safety area, e.g. at the rear of the machine or within the safety barrier!	 Danger

- At least once per shift, preferably before starting production, the machine should be checked for recognizable signs of damage and the function of the safety devices should be tested.
- Pay attention to any abnormal noise during operation and in case of such inform the shift supervisor!

2.4 General safety instructions

The instructions provided in the accident prevention regulations apply.

In the main these are:

- General regulations
- Electrical plant and equipment
- Power driven equipment
- Work on visual display terminals
- Safety identification at workplace
- Safety instructions on hydraulic and hose lines
- Regulations on safety and health protection for handling of hydraulic fluids
- Safety data sheets of the chemicals and materials used

2.5 Failure to use for the purpose intended

The machine is not intended for use other than for the purposes listed under point 1.4.

If the machine is not used for the purpose intended, safe operation of the machine is not warranted.

All other purposes of use are to be regarded as misapplication and therefore represent a misuse of the machine and its components.

It is the obligation and responsibility of the operating company to use the machine and its components and parts in accordance with the purpose intended.

2.6 Operating company obligations on care and attention

Plant safety in operational practice can be achieved only when all necessary measures are taken. The planning and execution of these measures is part of the machine operating company's obligation to pay care and attention.。

In particular the operating company must make sure that：

- The machine is used only for the purpose intended,
- The machine is operated only in faultless functional condition and that in particular the safety devices are tested regularly to make sure they function.
- The necessary personal protection equipment such as safety shoes, protective helmet, working gloves for operating, maintenance and repair personnel is available and is worn.
- The operating manual is always in a legible condition and is available in complete form at the machine location.
- Only qualified and authorized personnel operates, maintains and repairs the machine.
- This personnel is regularly instructed in all relevant questions of work safety and environment protection and is familiar with the operating manual and in particular with the safety instructions contained in this.
- That the safety and warning signs attached to the plant are not removed and that they are legible.
- That there are sufficient eye rinse bottles available on the plant for rinsing the eyes in the case of eye contact with isocyanate.

2.6.1. Safety measures prior to start-up

Carry out the following actions prior to starting up the plant:

- Check and ensure that all safety devices are fitted and functioning.
- Check the plant for visible signs of damage. Correct faults immediately or report them to the supervisor.

  The plant may be operated only when in faultless condition.

- Check that only authorized persons are to be found in the service area of the plant and that no other persons are endangered by the starting up of the plant.
- Remove all objects and materials not required for plant operation from the working area of the plant.
- Check all hoses for leaks and proper connection.

2.6.2. Safety measures during maintenance

Carry out the servicing work prescribed in the maintenance plan – setting, lubrication, maintenance, inspection – according to schedule.

Carry out the following tasks before starting the servicing work:

- The plant must be set at the safe initial position. Should this not be possible, the necessary precautionary measures should be carried out.
- Make sure that all plant parts have cooled to room temperature. Should this not be possible, the necessary precautionary measures should be carried out.
- Make sure that suitable lifting gear and load bearing devices are available for the replacement of components.
- Make sure that no unauthorized persons are in the plant working area.
- Make sure that suitable collecting trays are available to catch materials harmful to ground water (oils, coolants, etc.).
- It is recommended that these be disposed of at a certified waste disposal plant.

2.7 Personnel qualifications

It is a basic requirement that personnel working on the plant should be sufficiently qualified, capable and trained in order to guarantee secure operation. Various stages of the particular competence are required:

Schooled persons

- These are persons who have received instruction covering the operator tasks outside the protective and service area and for operation on the relevant plant and machines in the service area.

Authorized persons

- These are authorized persons with a professional training for all protected tasks in the protective and service area.
- Foremen, engineers or similarly qualified persons are responsible for all safety tasks on the plant and decide on measures to be taken in the case of malfunctions or irregularities in plant operation.

All persons carrying out tasks on the plant must read the operating manual and confirm through their signature that they have understood the operating manual.

For the following tasks the qualifications indicated are required:：

Task	May only be performed by		
	Schooled persons	Authorized persons	Supplier
Transport	X		
Erection			X
Commissioning			X
Training			X
Operation	X		
Maintenance and repair		X	
Cleaning	X		
Decommissioning		X	

2.8 Hazards

The plant has been so designed that no hazards for persons or equipment occur either in normal operation or in cases of probable malfunctions. Furthermore, various protective devices are fitted on the plant (see section 2.3).

2.8.1. Mechanical danger sources

Mechanical danger sources arise through the movements of the plant components. Thereby one must differentiate between:

- Relative movement of part components one to another resulting in shearing or crushing injuries (e.g., a closing process) …

In the service area no hazardous movements occur during operation when the safety equipment is functional.

Should the plant be designed so that movements occur, in the case of impact the movement is sufficiently slow and protective measures exist to cover the risk of crushing or shearing injuries.

In the secured area around the plant (= safety area) unforeseeable movements can occur. For these no special safety precautions exist.

	CAUTION It is forbidden to bypass the safety devices and enter the safety area when the plant is running.

The proper access points to the safety area are monitored by appropriate safety devices (see also section 2.9, Safety devices).

When work is carried out in the safety area the plant must be secured against restarting.

2.8.2. Electrical danger sources

When work is being carried out on the control cabinets there is danger to life through voltages up to 400 V. Therefore, care must be taken that:

- When work is carried out on the cabinets the main switch must be set at OFF and secured against re-actuating and that the control cabinets are free of current.
- The control cabinet doors are not opened during normal operation.

	CAUTION Even when the main switch is OFF external voltage is possible. This causes danger to life

- Always check that there is no current applied before undertaking work on electrical equipment.
- Refer to the circuit diagrams. Disconnect any external voltage sources and secure these against re-actuating.

2.8.3. Pneumatic and hydraulic danger sources

For work on the pneumatic and hydraulic equipment the following rules and instructions should be followed:

- All work on pneumatic and hydraulic equipment on the plant should under all circumstances be carried out only by properly qualified specialists.
- Before starting work release the pressure on all pneumatic and / or hydraulic plant components.
- When performing precautionary maintenance and repairs always change the hoses involved, even if these show no obvious signs of damage (refer to the data and instructions provided by the hose manufacturer).

2.9 Safety devices

2.9.1. EMERGENCY OFF

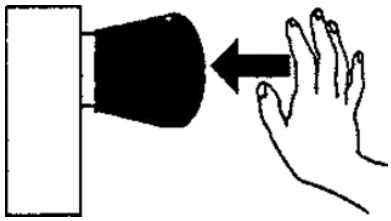
When the emergency stop is actuated, all dangerous movements are stopped practically immediately.

Before the plant can be restarted it is necessary to release or acknowledge the emergency stop function on site and then centrally at the control cabinet.

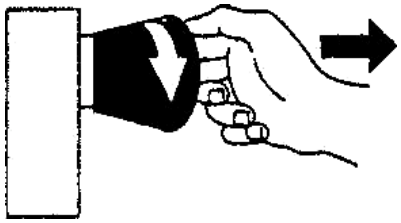
Actuate the emergency stop button only in a real emergency. Under normal circumstances the plant can be stopped using the controls. For details refer to the operating manual.

Each emergency stop represents high mechanical loading of the plant. Frequent use of the emergency off function leads to increased wear and tear of the plant.

How to actuate and release the emergency stop button:



To actuate press the emergency off button. The plant is stopped immediately. Restarting without further measures is not possible.。



To release the emergency, stop button rotate as indicated by the arrow.

The button snaps into place and is released. In order to restart the plant all emergency stop buttons must be in the released position and the emergency stop reset at the main control cabinet pressed.

3. Machine Description

3.1 2-component high-pressure foaming machine

The foaming machine offered by Henghui complies with the latest technological standards and is extremely low-maintenance.

The machine is equipped with magnetic couplings between pump drive (motor) and metering pump:

Advantages:

- There are no mechanical seals here, i.e., there are no leaks between motor and metering pump
- Repairs or stocks of wearing parts are not or hardly required

All metering pumps are frequency-controlled.

All pumping outputs are recorded by flow-meter. Frequency controllers, flow-meter and an intelligent software package form a closed loop control for maximum metering precision.

Advantages:

- High product quality due to fully automatic and absolutely consistent and accurate discharge rates
- Minor internal leakage is compensated by full control
- A change in the motor frequency for the same discharge rate indicates wear of the metering pump, i.e., replacement/maintenance of the pump can normally be planned outside production times without any interruption of production (while maintaining the metering accuracy)
- It is hardly necessary to check the discharge rates any more

The day containers are with cooling jacket, insulation with sheet-metal cover and electrically driven agitator.

Advantages:

- Maximum heat exchanger surface for extremely fast temperature adjustment

- Due to insulation, minimum heat emission to the production hall
- Sheet-metal cover protects insulation from environmental influences (UV) and mechanical damage
- Agitators ensure homogeneity of the raw material and temperature constancy
- Depending on the equipment, an axially effective, spring-pretensioned ceramic seal (non-wearing agitator shaft with long service life of the seal) or a magnetic coupling (complete mechanical separation of the materials, no moving wearing parts) is provided
- The ceramic seal ensures the freedom of wear of the agitator shaft and its long service life

The filling levels of the raw materials in the day containers are monitored permanently by a guided microwave.

Advantages:

- The desired refill quantities can be chosen freely and adjusted ideally to the corresponding production and can be preset or changed at any time via programming in the visualization
- Due to the selection of optimum values, the ideal homogeneity and temperature constancy of the respective raw material can be achieved
- To test new raw materials (or similar), the containers can be run to empty them
- The measuring principle of the guide microwave works independently of the chemical and physical properties of the component. The sensors therefore do not need to be recalibrated when a component is changed

The machine has a weekend switch for the re-circulation of raw materials, with re-circulation and standby times that can be programmed as required, as well as pumping capacities that can be programmed as required.

Advantages:

- During non-productive periods, the raw materials are automatically re-circulated in the ring lines and thus kept in a condition suitable for production

- Any blockage in the ring lines due to a reduction in viscosity by the cooling of the raw materials or by crystallization can be avoided

Disc filters in the intake line protect the pumps. They are equipped with ball valves for draining the lower end of the filter housing and have electrically activated cleaning devices (optional).

Both component lines can also be optionally equipped with a filter in the high-pressure circuit.

Electronic pressure gauges are used to monitor the pump pre-pressure and the mixing pressure of the components.

Due to the ideal arrangement of the sub-assemblies, excellent access for maintenance and repairs is ensured.

A mixing head hydraulic unit is integrated into the machine frame. The mixing head hydraulic system has been optimally designed for the mixing heads and other types of diffusers of comparable size.

Frequency converters

Frequency converters, for controlling the speed of the metering pump motors. They are for the fully automatic, continuous change of the metering pump's output and the initial controlling of the component flows to the required set value, before shot release and discharge by the mixing head.

Full control

This software / hardware package ensures that the speeds of the metering pump motors depend on the flow-meters by controlling the frequency converters via a PI program sequence that reacts quickly. The concept provides the constant comparison and correction of the current flow rate and mixing ratio data to the configured values.

3.2 Metering machine control

The control cabinet is attached to the frame of the metering machine.

The cables are protected from damage, as they are installed in the hollow sections of the metering system.

The power supply is ensured via the main cabinet of the entire installation.

The control cabinet of the metering machine is equipped with the following electrical components:

The following components are installed in the cabinet, depending on the equipment listed above:

- Control unit, Siemens S7
- Power supply for the metering pumps
- Power supply for the agitators (optional)
- Power supply for the mixing head hydraulic system
- Power supply for the temperature regulators (optional)
- Power supply for the electric disc filters (optional)
- Interface for automatic filling (optional)
- Regulation of the component temperature
- Regulation of the component pressures and flow rates

The following components are installed in the front doors:

- HMI
- Alarm reset button
- Emergency stop button
- Main switch/maintenance switch

Process and machine visualization

For visualization, which is based on the open visualization software

The system displays all of the relevant process data, alarms and error messages of the metering machine and enables access for changing the data.

For example, the following data is displayed for each foaming program:

- Date
- Time
- Shot number
- Shot time
- Total shot weight
- Discharge per component
- Polyol / isocyanate mixing ratio
- Overall flow rate
- Flow rate per component
- Component temperature
- Component pressure
- CAUTION: When performing maintenance, filling or draining work on the day containers, on the foaming machine and on the mixing head, always depressurize the container completely. Let the pressure release slowly.



4. Transport, Assembly, Storage and operation standby

4.1 Transport

Transport work may be carried out only by qualified personnel and the relevant transport, safety and accident prevention regulations must be observed.

For transportation the plant must be disassembled into transportable units. The subassemblies can remain as whole units.

The foaming machine can be loaded and transported as a compact unit.

Attention should be paid that the machine is transported or loaded in works by means of a fork lift truck.

If a crane is to be use consult supplier before doing so.

Do not stand or work under suspended loads!		 Danger

Observe the accident prevention regulations and safety instructions for lifting and transporting the machine!

Prior to machine transport

- Drain off the fluid of the hydraulic subassembly (hydraulic oil).
- Drain the liquid from the day tank.
- The component lines should be flushed.
- Catch leaking oil. Do not let this run off into drains or ground.

- Dispose of waste liquids according to regulations (see section 7, “Waste disposal and recycling”).
- Disconnect the machine electrically and pneumatically.
- Disconnect cooling and heating media.
- Disconnect automatic component refilling.

Safety instructions for transport

- The supervisor must have eye or audible contact with the operator.
- Disconnect all electrical, hydraulic and pneumatic connectors on each transport unit and secure for transport.
- Protect open pipe or hose conduits against contamination by fitting PVC plugs or caps.

- Use only suitable and technically faultless lifting equipment and load bearing devices with sufficient weight bearing capacity (approx. 4000 kg)!
- Use only suitable bearing and transport rollers!
- Raise and lower the machine and parts slowly.
- Avoid abrupt movements, bumps, tilting or vibration during transport.

The substrate on which the machine or machine parts are deposited must be ...

- clean
- level
- of required load bearing capacity.

After transport

- Remove loading gear, ropes and shanks.
- During any interim storage of the machine protect the components of the control cabinet against damp and dust.
- Drive cylinder, maintenance platform and hydraulic subassemblies should be assembled and the machine commissioned by specialists.

4.2 Assembly

The erection site floor must be strong enough to bear the static and dynamic loading of the machine.

The production plant is to be erected exactly according to the installation drawing.

- Erection may be carried out only by supplier assemblers.

Assembly foaming machine

After unloading the machine is to be brought to the factory internal installation site using a fork lift truck.

Lower the machine with care. Thereby observe the safety instructions provided above. Align the machine.

Lay the power lines to the control cabinet.

CAUTION: These tasks may be performed only by trained personnel.

Lay and connect the air supply line. See section 3.4.2 pressure input. Connect the heating and cooling lines.

Connect the metering machine to the ring line.

When the mixing head has been installed, the machine can be commissioned.

4.3 Delivery and storage

- On receipt of the machine at its destination the delivery note should be used to check that the delivered items are complete.
- The same applies for checking transport damage.
- Any missing parts or transport damage registered should be noted on the delivery note and supplier informed immediately in writing.

Interim storage

- Interim storage in the open is not permissible. The machine must be stored in a dry, temperature-controlled room (approx. 20°C).
- The machine must be protected from corrosive or aggressive influences.
- All bare machine parts should be sprayed with oil.
- Protect open pipe or hose conduits against contamination by fitting PVC plugs or caps.

4.4 Electrical equipment

When connecting the power supply to the electrical circuit the following points should be noted:

- Only properly qualified specialists should carry out electrical work.
- The AC power lines in the control cabinet must be connected according to the circuit diagram*.
- Properly tighten the cable clamps in the control cabinet.

5. Commissioning and Operation

5.1 Control and display elements

- The main switch is fitted on the control cabinet door and switches the machine off.
- Power supply to the machine is via the control cabinet of the mould carrier available.
- The main switch has the switch positions I and 0

- At position I the whole machine is switched on.

- All components are under voltage.

- At position 0 the machine is switched off.

The position serves to keep the machine stationary for maintenance and repair work.

Main switch on control cabinet



Control cabinet operation



Mixing Head operation



5.2 HMI (Human – Machine – Interface)

Cautions:

1. Control cabinet and touch screen are electronic products, pay attention not to have liquid sprayed on them during use.

2. When maintaining the equipment, please pay attention to the power polarity of the touch screen.

3. When cleaning, please use a soft cloth to wipe.

INSTRUCTIONS FOR USE

After the system is powered on, the screen first appears on the touch screen as shown in the figure.



Click the language selection button and the screen switches to the main screen.

The **main screen** is shown below



The upper side of the main screen is the screen conversion button area, there are 12 function buttons, which are as follows:

A. Operation (monitoring): most of the operating parameters are displayed and control parameters can be given.

B. Parameter setting: used to input each operating parameter, some key parameters are also password protected.

C. Options: used to select the operating process of the machine.

D. Mold param (auto station): used to input the injection time of each workstation. A total of 35 groups.

E. EXT mold param (manual station): used to set the injection time for the individual injection buttons on the panel.

F. I/O table: Used to view the current IO output status.

G. Fault information: when the system fails, prompt the user the type of failure.

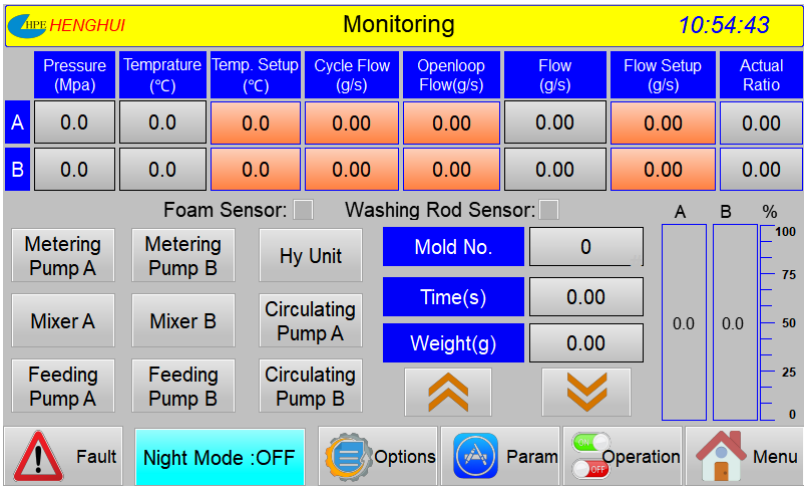
H. System: set system parameters.

I. Exit: return to the boot screen and log out of privileges.

A. Operation

Press the **Operation** (data monitoring) button in the main screen and the screen is shown as follows.





The button control area at the bottom left is used to control the motors of the metering pump, mixing motor, filling motor and hydraulic station. The top of the screen shows real-time information about the current flow rate and pressure and is used to set the flow rate value for each component. When the flow rate is given by the station, the flow rate given here cannot be entered into the computer, but is given by each station.

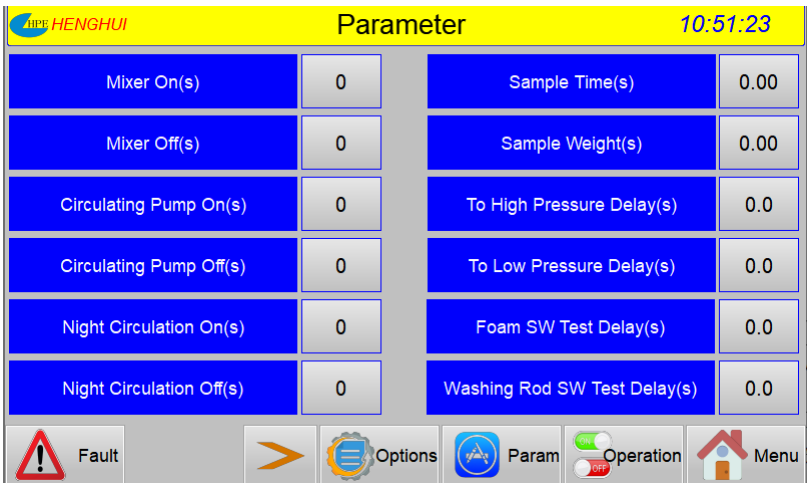
Please note: The flow rate must not be set beyond the maximum value that the motor can handle. When the motor speed polarity is exceeded, the inverter keeps running at the maximum speed, at which point the flow value may stop at a fixed

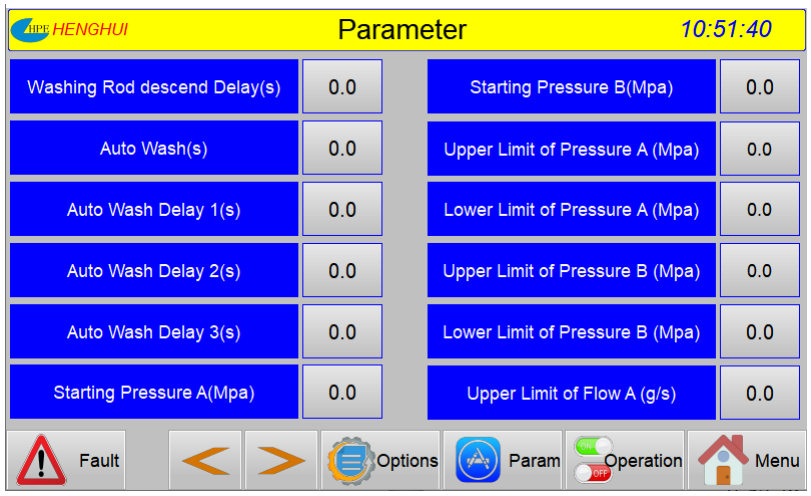
value and not rise again, or may not change in response to external conditions. That is, the control system loses its follower function.

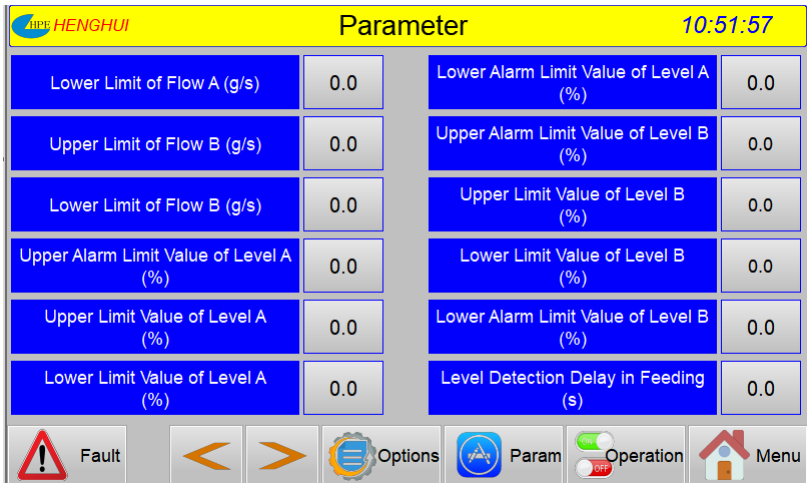
If the night cycle button at the bottom of the screen is pressed, the equipment selected in the measurement process will cycle through the on and off times set in the parameters.

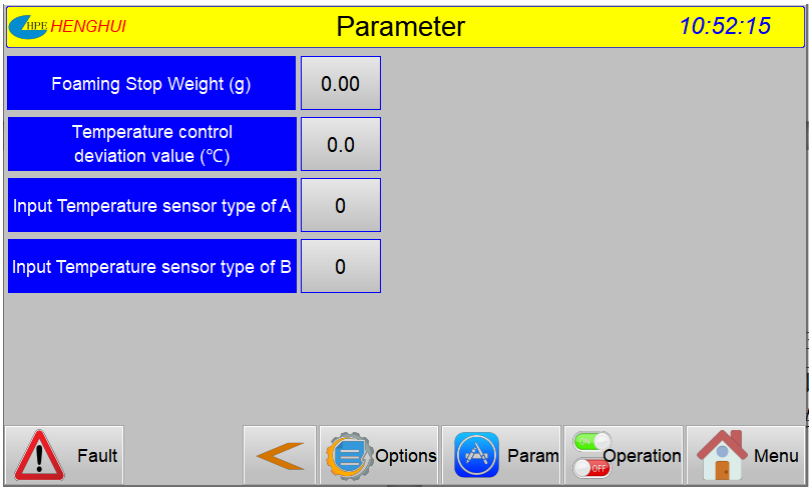
B. Parameter

Press the "**Parameter**" button in the main screen to enter the screen as shown in the figure.









This screen is used to enter the various parameters necessary to run the machine. This step must be done first for the first run, otherwise the device will not function properly.

The two parameters for setting the discharge volume are password protected. This is because they affect the flow control of the pump, i.e. the accuracy of the injection.

The meanings of some of the parameters are described below:

Sample time:

The time the machine runs when the sampling button is pressed. At this time, the machine's action is exactly the same as when the injection button is pressed.

Automatic high-pressure delay time/Automatic low-pressure delay time:

In the automatic high-pressure control, the time required for the machine to automatically run from low pressure to high pressure or to automatically resume from high pressure to low pressure after the injection button is pressed.

Injection switch detection delay:

When injecting, first lift the cleaning rod, if the high-pressure proximity switch is not turned on within this set time, the machine will return to the pre-injection state.

Cleaning rod delayed drop:

After filling the material, the cleaning rod stays in a high position for a long time.

Tank agitation on/off:

The time interval between its motor on and off when the selected irrigation agitation is automatic operation.。

Cleaning spotting on / spotting delay time 1\2\3:

When the process is set to cleaning spotting, the cleaning function will be turned on once (three times in total) when the spotting delay time reaches the set value respectively after the material is injected.

Flow & pressure & level upper / lower limits:

For status detection. An alarm will be issued when the set value is exceeded during operation. Pressure or flow exceeds the limit and stops. The upper and lower-level limits are also used to turn on and off automatic dosing in the case of automatic dosing.

Temperature control deviation value: used to stagger the temperature difference between heating and cooling in order to counteract temperature inertia.

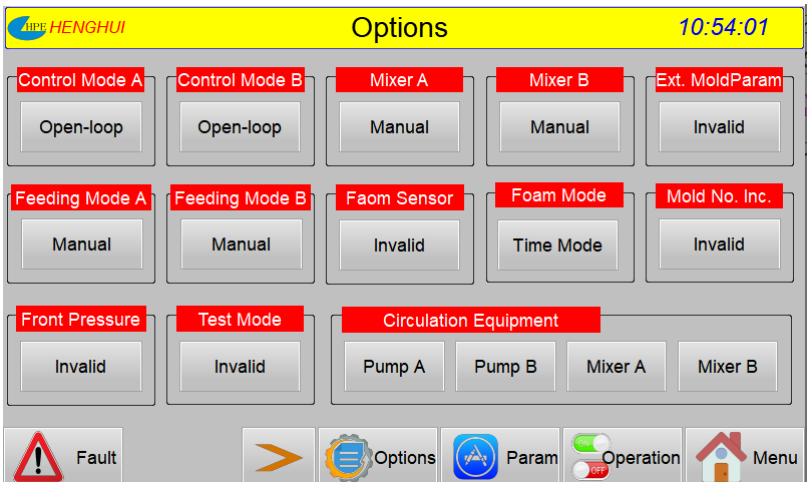
Temperature sensor type: according to the DTC module manual, selected according to the actual lamp type.

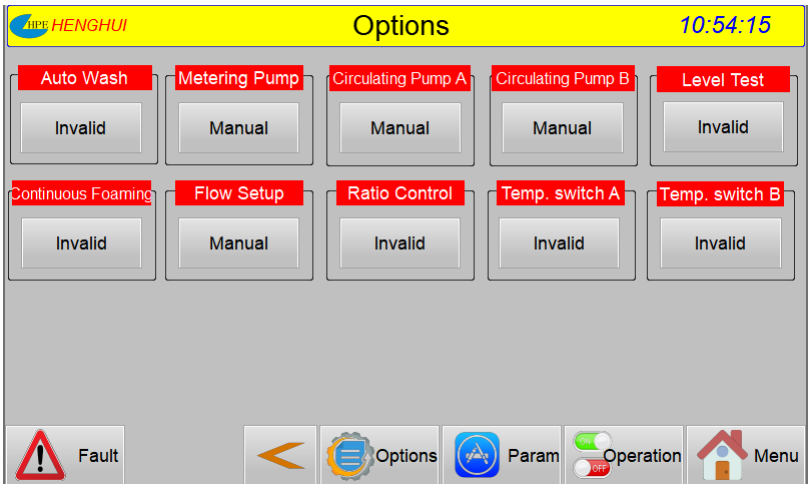
C. Option

Press the "**Option**" button on the main screen and the screen will change to the one shown below.

The correct process settings are the basis for the operation of the machine. In this screen, the functions of each process item are described separately.

Closed-loop control: In closed-loop high pressure, the given flow rate is automatically tracked, while in open-loop high pressure, the system operates according to the open-loop flow rate in the parameters, regardless of the given flow rate.





Mixing A/B: Automatic/manual: If manual operation is selected, the mixing motor will be switched on manually, if automatic operation is selected, it will be switched on and off automatically at the time set in the parameters.

Ext mold param: If external station is selected, the station number is determined using the switch on the operator box.

Front pressure: If you do not want to detect the pre-pump pressure status, you can select the off state.

Level Test: Here you can select whether to switch on the level alarm function.

Foam sensor: If selected not to be used, the injection proximity switch will not function and the corresponding alarm will not be prompted.

Flow setup: If manual is selected, the flow rate feeding of A and B can be freely given. If not the flow rate can only be given via the station parameters.

Mold No. inc: If invalid is selected, the station number will not increase after each completed filling, on the contrary, if valid is selected, the station will automatically increase by one after the filling is completed.

Test mode: No alarm will be triggered if the metering pump hydraulic station is not opened in the test mode.

Pump motor, filling control: can be selected between automatic and manual. If automatic operation, the pump will automatically operate according to the time or level set in the parameters. Otherwise, the motor has to be controlled manually in the "real time control" screen.

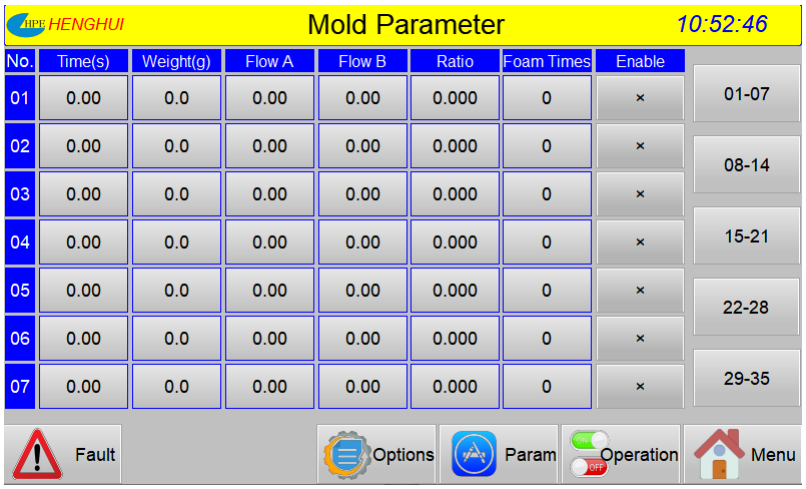
Auto wash: If On is selected, the system will automatically run the cleaning at the dipswitch time set in the parameters when the material is idle. At the same time the hydraulic station, relief valve etc. will also operate together. The dipswitch is automatically switched off when the material is being injected.

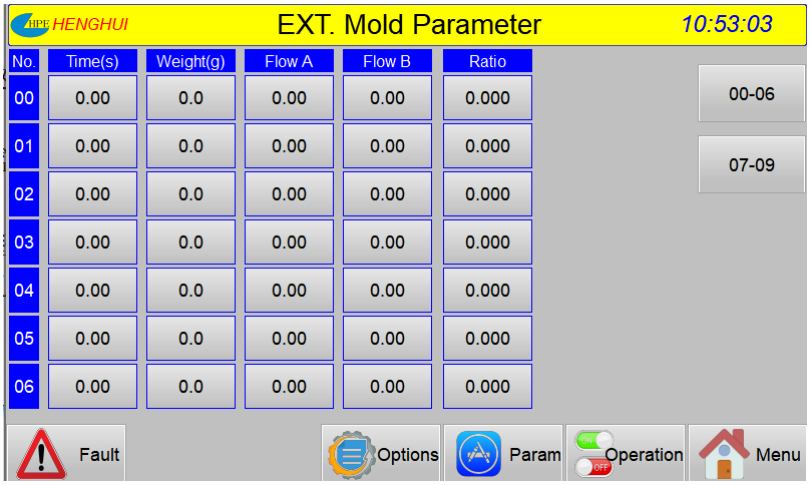
Metering pump mode: automatic or manual can be selected. If automatic is selected, the metering pump is automatically switched on when the injection button is pressed and the set pressure is reached and the injection starts. Otherwise the metering pump can only be switched on manually.

D. **Mold para**

In the main screen, press the "**Mold para**" button to enter the screen as shown in the picture.

This screen is mainly for setting the injection time for each station. There are 35 groups. Press the switch button below to switch between the different station sections to enter the times. This is also same as the Ext-mold para station format.





The difference between the manual and automatic stations is that the manual stations do not have the option to **Enable**.

Foam times: each station is filled a set number of times and increments to the next station after the corresponding number of fillings.

Enable: stations that are not used are automatically skipped;

Ratio: when the ratio is controlled, the given flow rate is calculated according to the given ratio value.

E. **EXT-mold para**

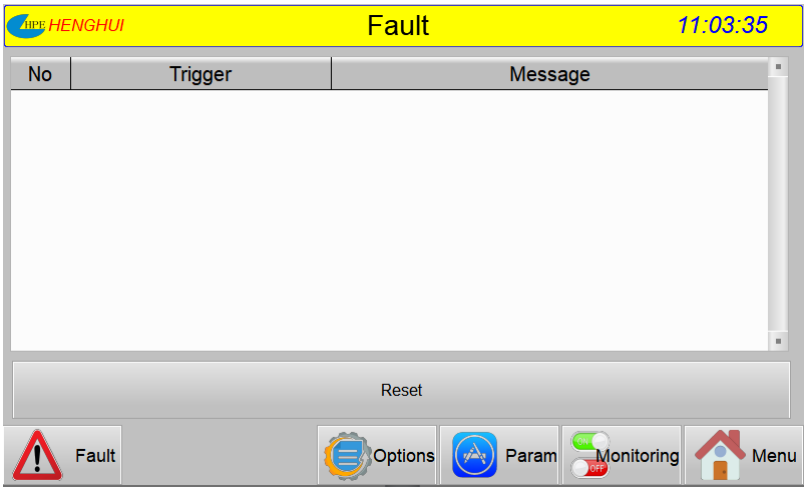
See above mold para section.

F. I/O Monitoring

This screen is used to display the current actual PLC configuration and can control the current status of the inputs and outputs in real time.

G. Fault information

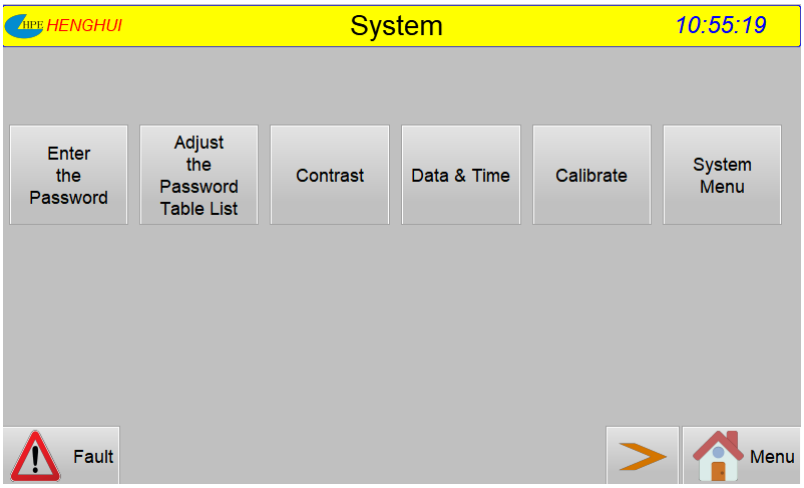
In the event of a system fault, or if the "Fault information" button on the main screen is pressed, the screen will change to the screen shown in the figure.

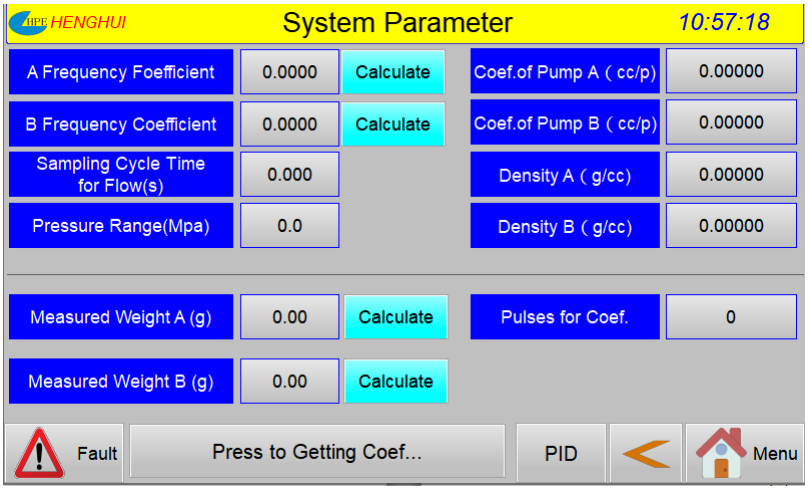


When an alarm occurs, a fault indication is displayed on this screen, indicating the operator the type of fault. Once the fault has been cleared, press the reset button and the fault indication disappears and the machine can be switched back on. If you press "Turn off audible and visual alarm", the alarm will not sound even during a fault. However, the message remains.

H. System

You can access this page by clicking on the "System " button on the main screen and entering the appropriate permissions password. The page is shown in the picture.





The system settings are mainly used to change some of the system parameters of the touch screen. The main functions are as follows:

A. Password; first press the "Enter password" button, which is used to confirm the operator's operating rights. Then, click the "Password Modify" button, at this time, all passwords below the input authority can be displayed in the table, and can be modified.

B. Adjust the screen contrast; to prolong the life of the touch screen, please do not adjust this parameter too much.

C. Adjustment of the system time;

Frequency/flow coefficient: when a given flow rate is converted into the operating frequency of the frequency converter, there is a coefficient, which can be obtained by dividing the current frequency by the given flow rate after the displacement has been accurately determined. The automatic calculation button can be pressed at high pressures and when the flow rate is stable.

Flow sampling period: The system calculates the flow rate at a set time period. The flow rate is measured in seconds, so a value of 1 second is appropriate.

Displacement pulse count: The number of pulses to be used when measuring the displacement.

Pressure range: The value of the object represented at the maximum value of the corresponding transmitter output.

A/B pump displacement/density: this parameter is more important and requires an operator with certain authority to modify it. In general this parameter cannot be modified after commissioning. With these two parameters the system calculates the weight of the raw material for each pulse.

The flow coefficient needs to be calculated automatically after the flow rate has stabilised under high pressure.

Displacement measurement steps

1、 Press the button for measuring the discharge volume;

2. Set the number of pulses to measure the displacement. The larger the number, the better the accuracy.

3. Set the process to test state, turn on the metering pump for the component to be measured; turn off the other component pump and tighten the pressure screw so that the material does not come out;

4、 Press the sampling button. (Do not press the injection button!)

5、 Divide the measured weight by the set number of pulses and fill in the displacement parameter.

I. Exit

Return to the main screen

6. Preventative maintenance and repair

6.1 Protective equipment for maintenance work

The operating company must prescribe the wearing of personal protective equipment to the operating and maintenance personnel.



If these instructions are <u>not</u> followed, serious injuries can occur!	 Caution
First aid equipment (first aid kit etc.) should be kept easily accessible.	
Note the location and how to use fire extinguishers. Note fire alarm and fire-fighting facilities.	

During all work processes involving operation and adjustment of tools and their safety devices the switching on and off processes according to the operating manual must be followed!

The plant operating company must have one or more water bottles available on the metering machine for eye rinsing.



6.2 Maintenance

Repair and maintenance work on the machine may be carried out only be properly trained and authorized specialists and the safety instructions and valid accident prevention regulations must be followed.

Check the machine regularly and inform those responsible for the machine when repair and maintenance work is necessary (see lubrication and maintenance plan).

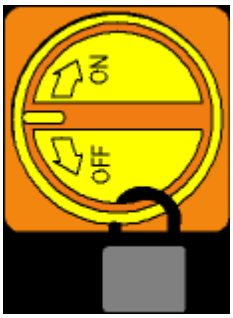
Failure to follow these instructions involves the risk of serious body injuries (e.g., risk of crushing) through uncontrolled movement of individual machine elements.



Danger

Prior to repair and maintenance work

- Switch off main switch and secure this with a padlock to prevent unauthorized switching on of the machine.
- Release pressure on hydraulic, heating, cooling water and pneumatic systems.
- Check on the pressure gauges that the systems are pressure free.
- During this work use only the proper tools and replace worn parts, screws, nuts, etc. only with original spare parts.
- Mark components and pipes for identification before dismantling.



	Caution: During all work with polyol and isocyanate components protective gloves and safety glasses must be worn.

6.3 Safe maintenance of electrical devices

Permit only electricians to carry out work on the electric supply equipment.

Safety rules to be followed during maintenance of electrical components:

- Switch off main switch.
- Secure main switch against switching on.
- Check that no voltage is applied.
- Cover components in the vicinity that are under voltage.
- Check the electrical equipment of the machine regularly.
- Loose connections and damaged cables should be remedied immediately.



Danger

Only authorized personnel with a key or opening tool are permitted access.

For work on current carrying parts for enhanced safety a second person should be present. This person should stand continuously at the EMERGENCY OFF switch in order to operate this should an emergency arise. Thereby sight contact with the first person (carrying out the work) is absolutely necessary.	

6.4 Safe maintenance of pneumatic devices

Only persons with special training and experience should be permitted to carry out work on the pneumatic system.

Safety rules to be followed during maintenance of pneumatic components:

- Switch off main switch and secure this with a padlock to prevent unauthorized switching on.
- Close main valve.
- Release pressure on those sections of the system and pressure lines before starting repair work. Possibly interrupt pneumatic hose (main line).



Danger

6.5 Lubrication and maintenance plan

In order to maintain an operational and functional condition of the machine carry out the following test and control actions:

- The results of the control actions are to be recorded in the test sheet attached herewith!
- This test sheet must be attached to the machine so that it is visible.
- Conforming to the check intervals permits high availability rates of the tool changing and shuttle system.

A test book should be kept on the checks performed recording

- The item No. being checked
- The checker's name
- The date of the check

	Caution: During all work with polyol and isocyanate components protective gloves and safety glasses must be worn.

No.	Test area	Task
	Safety devices	
1	EMERGENCY STOP button; function	Test
	Foaming machine	
1	Machine area, collecting trays and vicinity	Clean
2	Flange and screw connections	Check
3	Drive motors ventilator	Check/Clean
4	Oil filters	Clean

5	Adsorption air drier	Check
6	High pressure filter	Check
7	Metering pump for knocking	Check
8	Day tank for leaking	Check
9	Temperature control unit for leaking	Check
10	DOP tank	Check
11	Plate heat exchanger	Check
12	All component hoses	Check/Replace

	Pneumatic system	
1	Pneumatic maintenance unit (Sinter filter, condensate)	Check/Clean
2	Pneumatic cylinders, valves, hoses, pressure gauges	Check
3	Silencer	Check
4	Connections	Check
5	Screw joints	Check
6	Displays	Check

	Hydraulic / water system	
1	Hydraulic filter	Check/Clean
2	Oil level	Check
3	Oil	Check
4	Connections	Check
5	Displays	Check
6	Ball valves	Check

7	Pressure control valve	Check
8	All hydraulic hoses	Check/Replace

	Electrical equipment	
1	Illuminated pushbutton, control lamps	Check
2	Fan covers of all electric motors (metering / hydraulic)	Clean
3	Initiators LED – switch displays	Check
4	Connections, cables	Check

Lubrication and maintenance plan (mechanical, pneumatic, electrical systems)

Tasks to be performed	Operating hours	
	10,000	Every 5 years
	2,000	Every year
	1,000	Half yearly
	200	Monthly
	50	Weekly
	8	Daily
Mechanical:		
Clean machine area, collecting trays and vicinity		Daily
Check flange and screw connections, if necessary, tighten		Weekly
Clean drive motor ventilators		Weekly
Rotate oil filters		Daily
Check adsorption air drier		Daily
Replace air drier filter		Service manual instructions
Check high pressure filter display		Daily
Check metering pump and motor noises (knocking)		Daily
Check day tank for leaking		Daily
Check temperature controller for leaking		Daily
Check fill level DOP tank, top up (Option)		Daily
Check plate heat exchanger for leaking		Daily
Check rubber shock absorbers		Weekly
Check cooling and purging air		Daily
Check insulating material for damage		Weekly

Check water connections for leaking	Daily
Clean complete plant	Monthly
Check all component hoses	Monthly
Replace all component hoses	Every 4 years

	Caution: During all work with polyol and isocyanate components protective gloves and safety glasses must be worn.

Hydraulic system	
Check all hydraulic components for leaking, damage	Weekly
Check all pipes and hoses for leaking, tighten screw connections where necessary	Weekly
Check ball valves for smooth operation	Weekly
Check oil level	Daily
Oil change	Every year
Check function of displays	Daily
Check all hydraulic hoses	Monthly
Replace all hydraulic hoses	Every 4 years

Pneumatic system	
Check all hydraulic components for leaking, damage	Weekly
Check pneumatic valves, hoses, pressure gauges for leaking	Weekly
Check display function	Daily
Check silencers for dirt and function	Weekly
Check screw connections for leaking	Daily
Check function of pneumatic displays	Daily

Electrical system	
Check function of safety limit switches and initiators	Daily
Clean all initiators, sensors, mirrors and check functions	Weekly
Check function of and clean all lamps	Daily
Clean all pushbuttons	Daily
Check motor for noise (knocking)	Daily
Clean motor cooler grill	Weekly
Check oil level	Monthly
Change gearbox oil	Every year
Test emergency off	Daily

	Caution: During all work with polyol and isocyanate components protective gloves and safety glasses must be worn.
	Filling the accumulators may be accomplished only of a certified hydraulic company.

6.6 Check sheet

Name	Date	Task	Item checked	Comment

Occurrences / breakdowns during production

What occurred?	Reported on	Date / name

6.7 Cleaning and maintenance

Machine

- Proper maintenance helps to keep the machine in good working order.
- The machine must be thoroughly cleaned at least once weekly.
- No metal objects such as scrapers, screwdrivers should be used to clean bare metal machine part surfaces such as piston rods, guide channels and similar parts.
- No aggressive detergents or solvents (damage seals) or especially sandpaper may be used for cleaning.
- Cleaning with compressed air should also be avoided, as this blows dirt particles into the seal area and causes damage to the seals.
- Do not used cloth that deposits fluff for cleaning.
- Solvent cleaners should be used for the machine parts.

Lubricants	Applications
Molykote 3694	Toothed racks, cogwheels
Universal grease 22	Ball bearing, spindles, chain drives
Adhesive grease K3k	Runners, die sets and similar parts.

Oils	Applications
Hydraulic oil ISO Viscosity class VG46 HLP DIN 51524/2	Hydraulic system
Gearbox oil (See oil comparison list)	Drive motors

Cleaning agents	Applications
Solvent cleaner	All machine parts

Hydraulic oil and lubricant list

Hydraulic plants of machines and tools may be run only with hydraulic oil ISO of viscosity class VG46 HLP DIN 51524/2!

When refilling use only the same type of hydraulic oil.

Oil manufacturer	Nomenclature	Grease for slides	Greases for high surface pressure
Agip	AGIP OSO 46	AGIP GR MU 2	AGIP GR MU/EP 2
ARAL	Vitam GF 46 Vitam DE 46	Aralub HL 2 Aralub LF 2	Aralub HLP 2 Langzeitfett H
AVIA	Avilub RSL 46 HVI 46 or HLPD 46	AVIA multipurpose grease	Avilub Spez. EP
bp	Energol HLP 46 Energol HLP-D46	Energrease LS 2 BP Langzeitfett	Energrease LS 2 BP longlife grease
Castrol	Hyspin AWS 46 Vario HDX	Spheerol AP 2	Castrol LZV-EP
ESSO	Nutoh H 46	Beacon 2	Beacon EP 2
FINA	Hydran 46	Marson L 2	Marson EPL 2
FUCHS	Renolin MR 15 VG 46 Renolin B 15 VG 46	Renolit FWA 160	Renolit FEP 2
Mobil	Hydraulikoil Medium Mobil DTE 25	Mobilux 2 Mobilgrease MP	Mobilux EP 2 Mobilgrease Spez.
	Thelius Oil 46 Hydrol DO 46	Alvania Fett R 2	Alvania EP Fett 2
TEXACO	Rando Oil HD D 46 Alcor Oil DD Z 46	Multifak 20	Multifak EP 2
Valvoline	Valvoline ETC-30	Valvoline LB-2	Valvol.Grease 100 KB
SIPS	K 53 + MoS2		

6.8 Maintenance of motors and gearboxes (SEW)

For all SEW gearboxes used on the plant/machine the following maintenance intervals apply:

Time interval (minimum)	Machine hours	Task
Half yearly	3000	Check oil
According to operating conditions (Every 3 years at the latest)	See chart	Change mineral oil
		Change cylinder bearing grease
According to operating conditions (Every 5 years at the latest)	See chart	Change synthetic oil
		Change cylinder bearing grease
SEW gears R07, R17, R27, F27 and Spiroplan have lifelong lubrication and are thus maintenance-free		
Surface Anticorrosive paint	Dependent on external factors	Retouch/repaint

*For special models operating under difficult/aggressive ambient conditions the oil should be changed more frequently

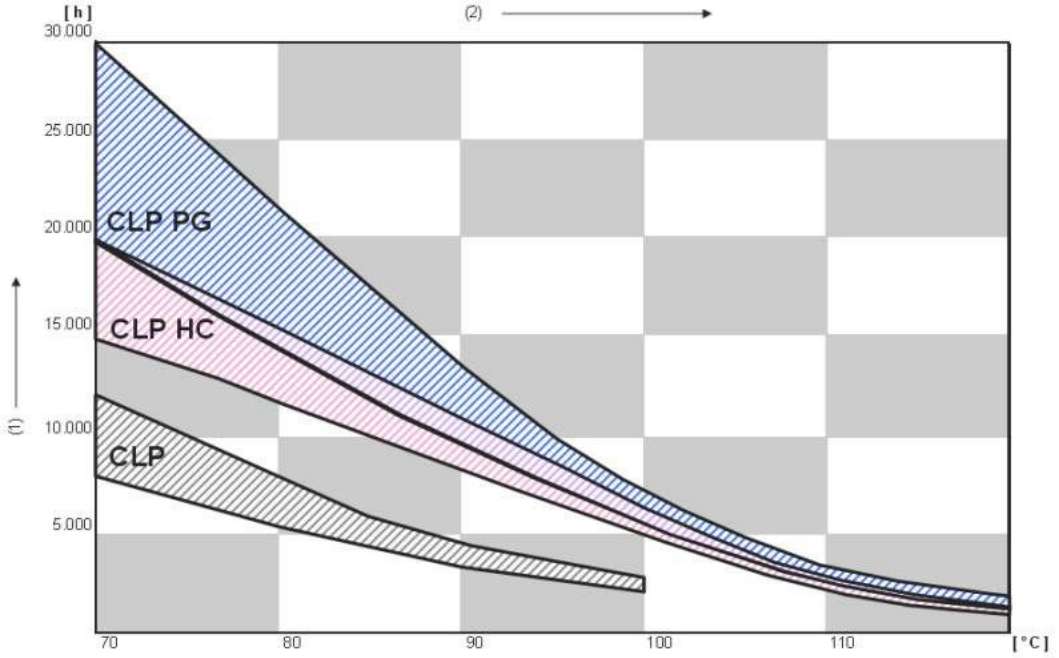


Chart: Change intervals for standard gears under normal ambient conditions

1) Operating hours

2) Oil bath under duration high temperature (average 70°C depending on oil type)

Check/change gearbox oil

	Do not mix different synthetic lubricants together or with mineral lubricants! As a standard lubricant mineral oil is used. The position of the oil level and oil drain screw as well as the location of the air venting valve is dependent on design and can be seen from the construction drawings.

Check oil level

	Switch off current to gearbox motor and secure against switching on again! Wait until the gearbox has cooled before touching it. Risk of burns!
	● In case of design changes please refer to section “Setting up gearbox”! ● For gears with oil level screw: Remove oil level screw, check level, if necessary, top up, retighten oil level screw.

Check oil

	Switch off current to gearbox motor and secure against switching on again! Wait until the gearbox has cooled before touching it. Risk of burns!
	● Drain off some oil at the oil drain screw ● Check oil condition – Viscosity – If the oil shows visible strong contamination, an earlier oil change is recommended ● For gears with oil level screw: Remove oil level screw, check level, if necessary top up, retighten oil level screw

Change oil

	Change oil only when the gearbox* is warm from running *(The gearbox should still be warm, as too cold oil does not flow well and makes proper emptying difficult)
	Switch off current to gearbox motor and secure against switching on again! Wait until the gearbox has cooled before touching it. Risk of burns!
	Position a vessel below the oil drain screw Remove oil level screw, venting screw / valve and oil drain screw Drain off oil completely Retighten oil drain screw Refill oil of same type through the venting hole - Refill the quantity of oil according to the model or specification plate (or SEW documents) - Check fill level at oil level screw Retighten oil drain screw Replace and retighten venting screw / valve

7. Disposal and Recycling

7.1 Environment protection

For all work on and with the machine the valid regulations on avoiding waste and on proper disposal or recycling should be followed!

In particular during installation, repair and maintenance work

Attention must be paid that no water contaminants such as

- Lubricant greases and oils
- Hydraulic oils
- Coolants
- Solvent based cleaning liquids

escape into the ground or the drainage system!

These materials must be stored, transported and disposed of suitable containers.

7.2 Oil and oil containing waste

Oil and oil containing waste represents a high-risk factor for the environment. Therefore, disposal of these is performed by specialist companies.

Polyol and isocyanate waste represents a high-risk factor for the environment. Therefore, disposal of these is performed by specialist companies.

Pass these waste products to your company internal disposal unit to be passed on to specialist companies.

Disposal

If the machine or part of the machine is permanently taken out of operation, the valid laws and regulations on disposal must be followed.

In any case it should be checked what materials can be recycled.

These must then be sent to a suitable recycling company.

8. Technical Data

9. Recommended Spare Parts