Cast-on strap machine

AGM 3

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1.0.0 Product description

1.1.0 Proper use

The COS has been constructed exclusively for the cast-on process of connectors and poles on the plate-sets for IB cells.
(DIN and British Standard, 2-8 positive plates)

For proper use, it is also necessary to read the operating instructions and to comply with all of the instructions therein, especially the safety instructions. This also includes performing all inspection and maintenance work at the prescribed intervals.
Any other use or alteration of individual components (resetting, removing, adding) can cause disruptions in the production process and result in an increased safety risk for the operating personnel! Please contact the manufacturer before making any changes!

The operator, and not the manufacturer, is responsible for any personal and property damages that result from improper use!

1.2.0 Warranty provisions

The valid warranty provisions are determined in the delivery conditions.

The warranty is voided if

- Damage results from use not in accordance with regulations or improper operation
- Repairs or manipulations are made by persons who are neither authorized nor trained to do so
- Spare parts are used that are the cause of the damages and were not authorized by HADI.

1.3.0 Design

The machine consists of set transport, plate swiveling device, mold with heating and temperature sensors,
inlet channel and drain channel with heating and temperature sensors, tin- and flux station, lead melting furnace with pumps and heating, lead bar feeder; temperature sensors and transportation.

1.3.1 Components of the machine:

Transport

Mold and ejector

Tin and flux bath

Lead melting furnace

Plate swiveling device

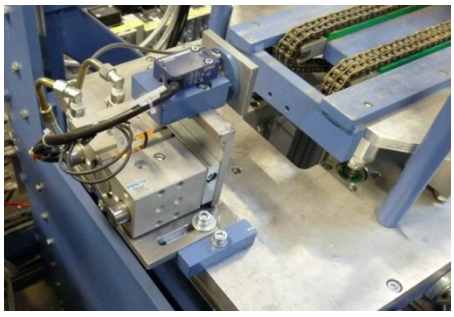
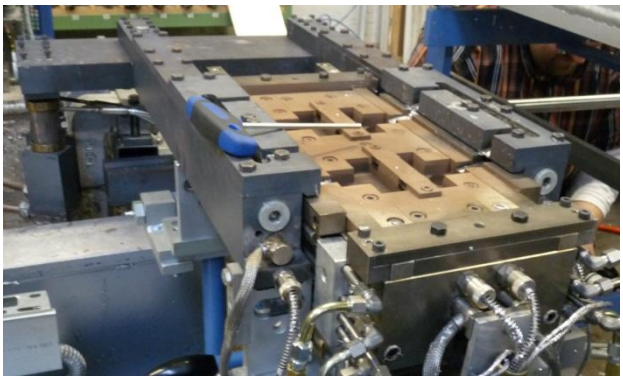


Plate set centering



Mold and channels

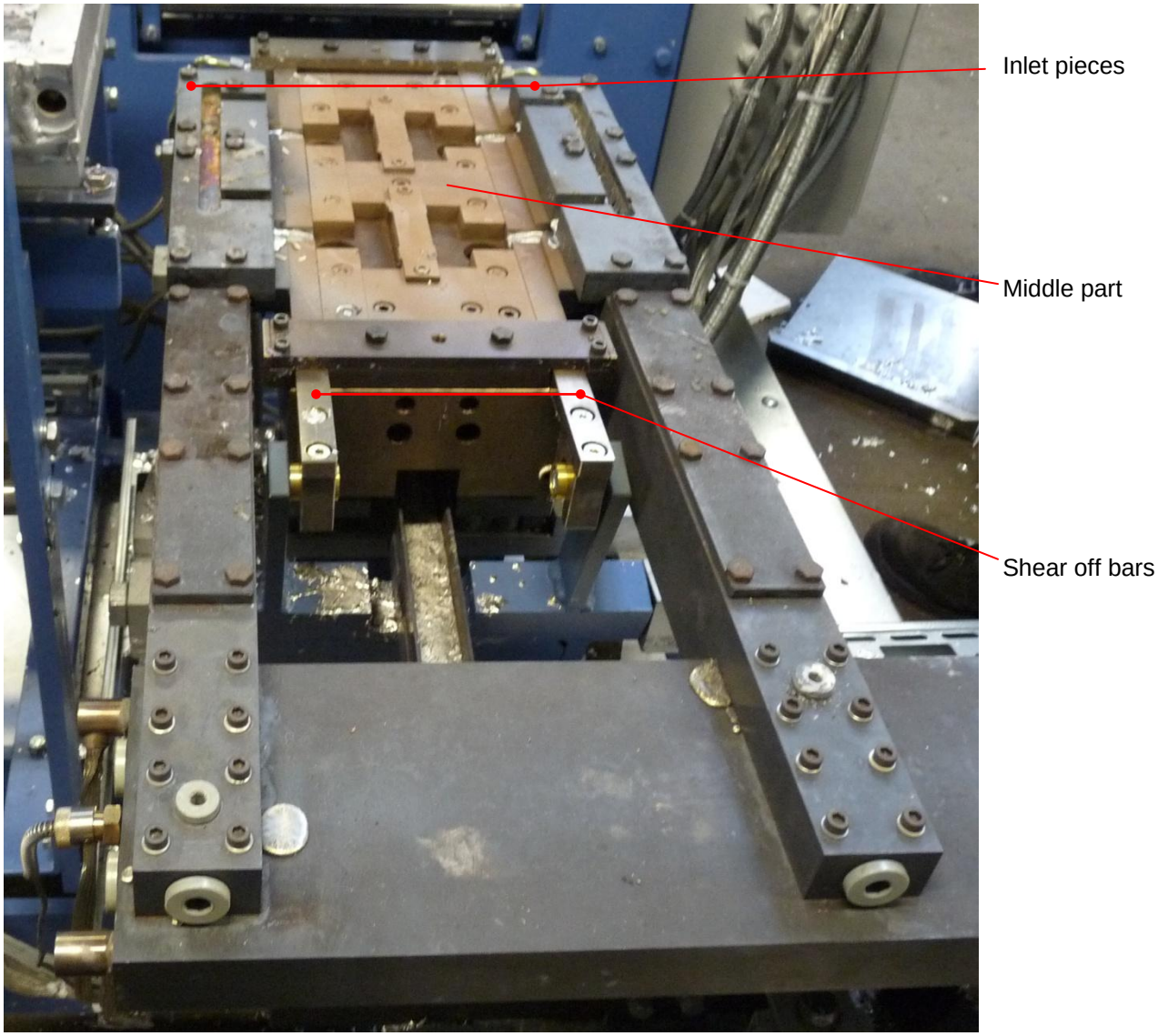
Cooling

Pneumatic

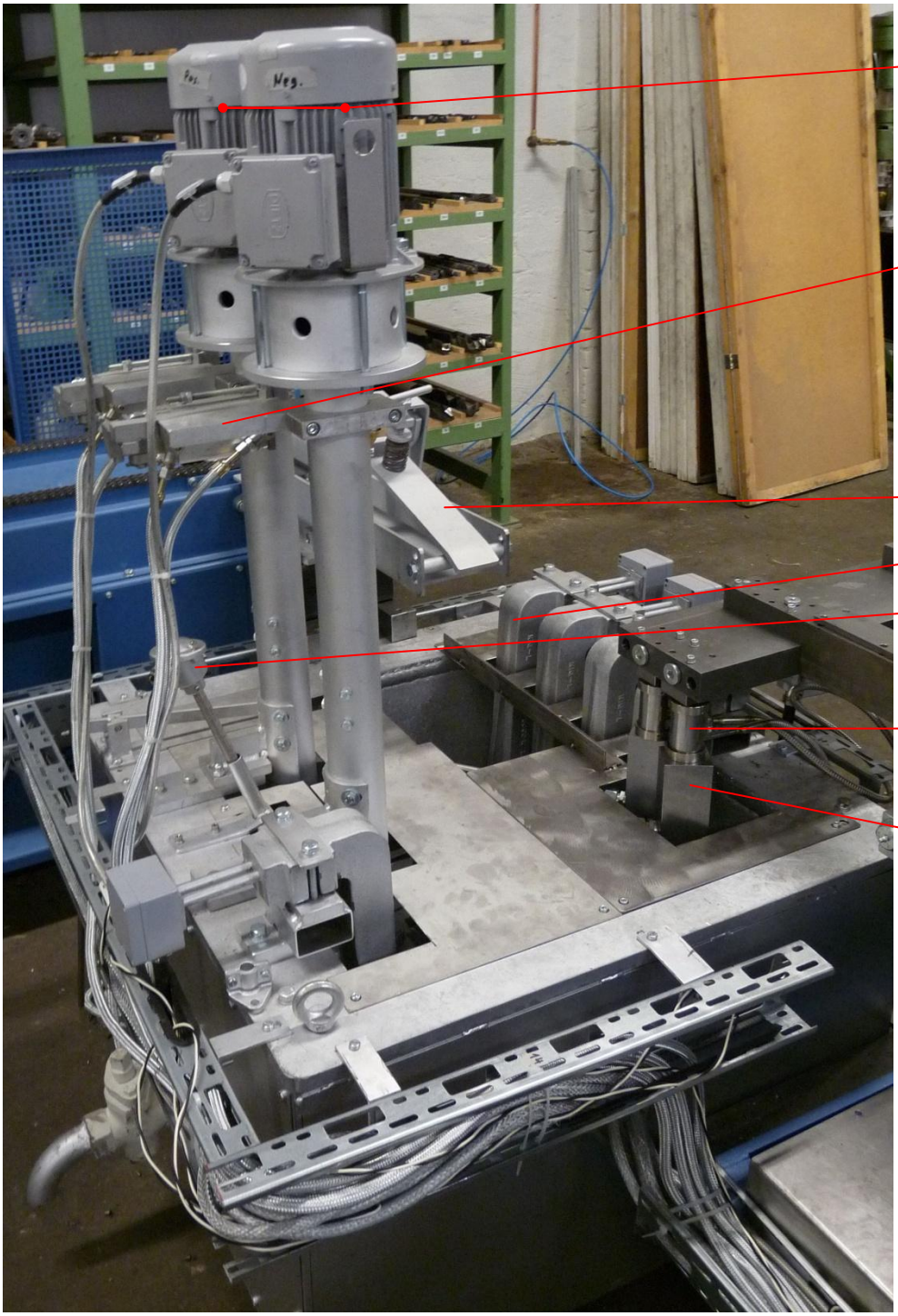
Lead pump

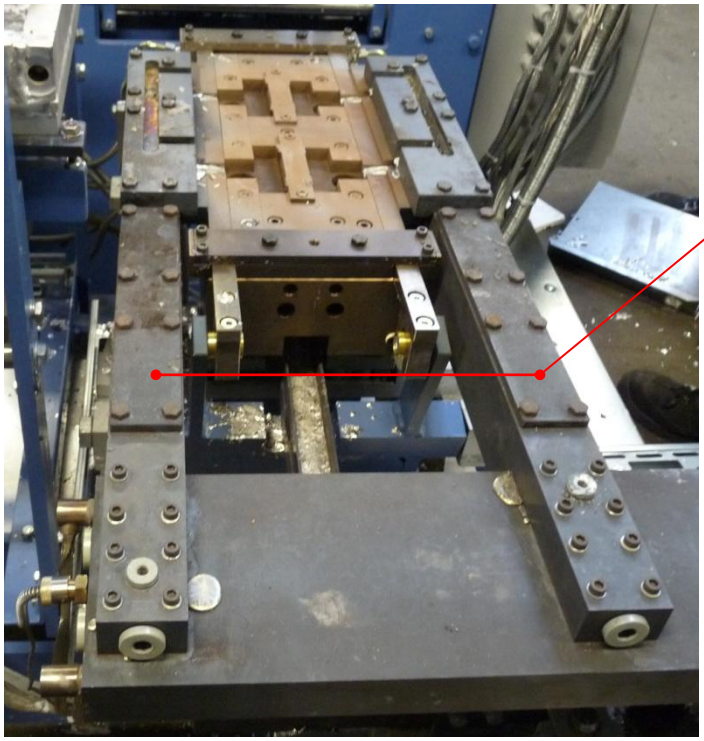
Switchgear cabinet

1.3.2 Mold



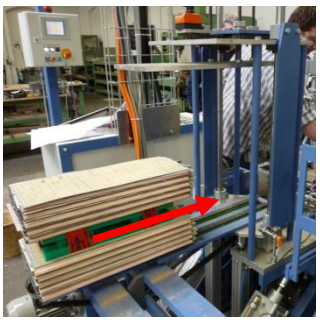
1.3.3 Lead melting furnace




Inlet channels

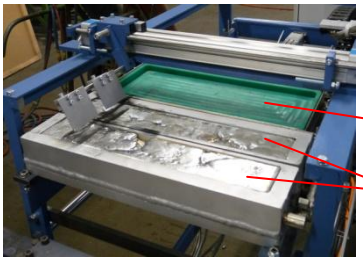
1.4.0 Functional Description

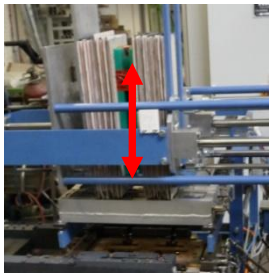
A transport system leads stacked and aligned plate sets to the entry of the machine.



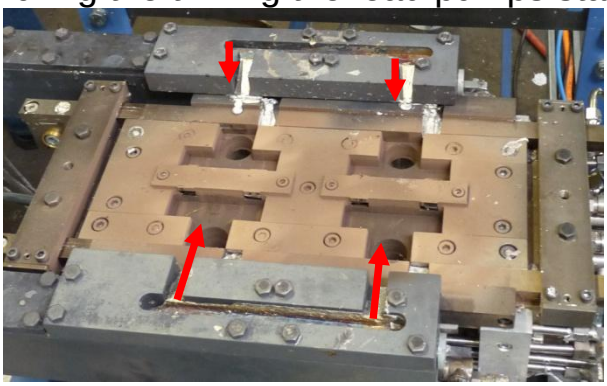
The plate set is pressed by means of a cylinder against slipping and then lifted and swiveled.

The plate set runs over the flux bath and is lowered and the lugs are fluxed.
The pole inserter puts the pole hulls in the mold and moves back to its starting position.
The plate set shall be raised and continues through the tin bath.
Before dipping a pusher travels over the tin bath to remove the slag from the surface.
Then the plate set is lowered and the lugs tinned.

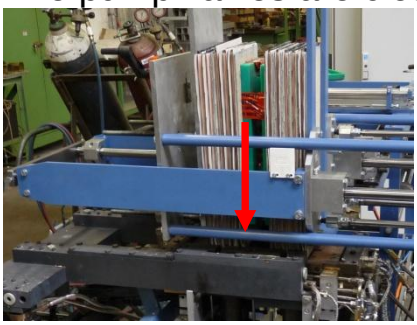




During the tinning the lead pumps start pumping lead; in the mold.

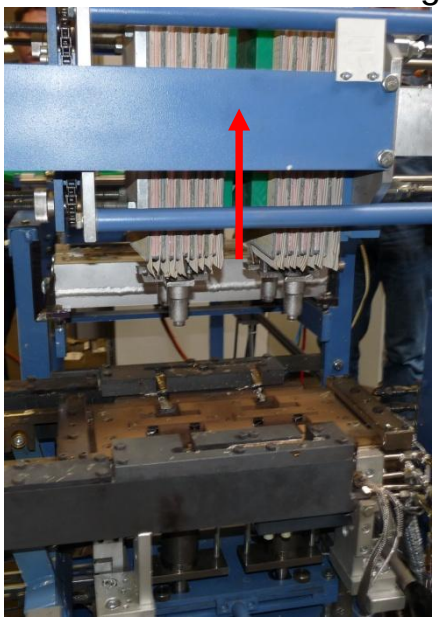


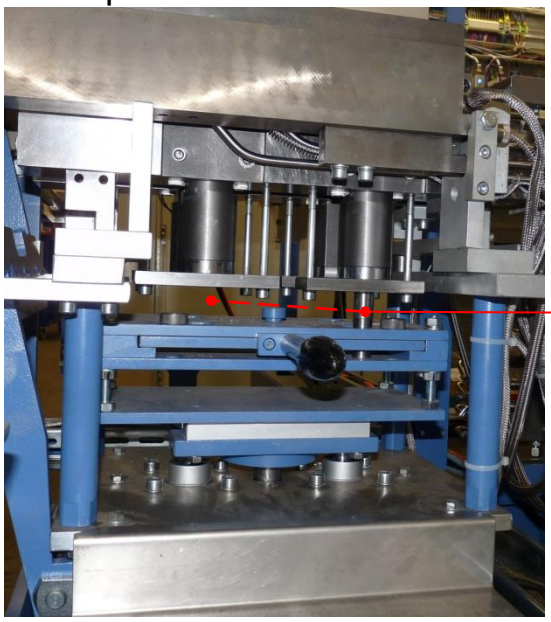
After the tinning the lifting- and swiveling unit raises. The tin bath returns to the starting position. The lifting and swiveling unit is lowered so that the lugs of the set are lowered into the mold.
The pump valves are closed No lead will be feed.



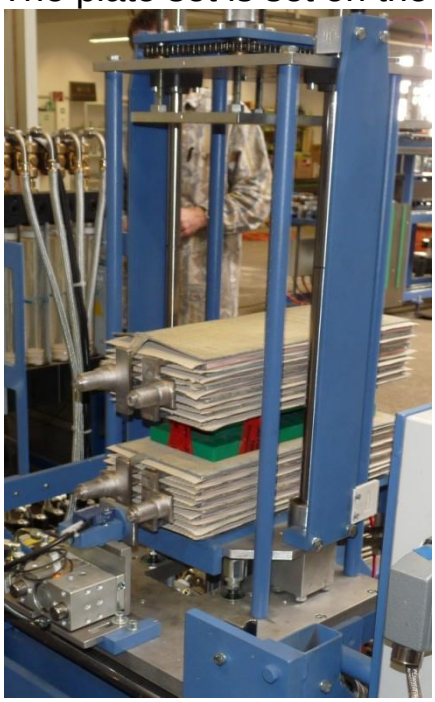
Is the lead solidified, the shearing bars are activated.

The ejector cylinders and the lifting and swiveling unit are raising at the same time to mold the bridge and the poles.





The lifting and swiveling unit swings back.It drives to their original position and loweres.
The plate set is set on the conveyor chain and removed.



1.5.0 Technical Data

Performance	approx. 1 double set/120sec
Electric connections	3 x 400 V, 50 Hz, 65 kW
Control voltage	24 VDC
Air pressure (working pressure)	6 bar
Weight (machine)	900 kg
Weight (Switchgear cabinet)	600 kg

2.0.0 General safety instructions

2.1.0 Duty of care of the operator

The machine was designed and constructed with consideration for a danger analysis and after careful selection of the harmonized standards to be complied with, as well as additional technical specifications. The machine therefore corresponds to the state of technology and offers the highest degree of safety during operation.

However, machine safety can only be ensured during practical use if all necessary measures are taken to ensure this. The operator of the system is responsible for planning and checking the performance of these measures

The operator must especially ensure that

- the machine is only used in accordance with regulations (compare with the section "Use in accordance with regulations" in the product description chapter).
- the machine is only operated in perfect, functional condition and that the safety equipment is especially checked for function on a regular basis
- the necessary personal safety equipment is available for operating, maintenance, and repair personnel and that this equipment is used
- the complete operating instructions are always available at the operation location of the machine in a legible condition.
- only personnel that is qualified and authorized to operate the machine operates, maintains, and repairs it.
- this personnel is regularly instructed regarding all applicable questions of work safety and environmental protection and that the personnel is familiar with the operating instructions and especially the safety instructions therein
- all safety and warning signs on the unit are legible and are not removed

2.2.0 Explanation of the safety symbols used

Concrete safety instructions are listed in the following operating instructions in order to denote remaining risks that cannot be avoided during operation of the line. These remaining risks represent hazards for

- Persons
- Product and machine
- Environment

The symbols used in the operating instructions are especially intended to draw attention to safety instructions!

Danger

This symbol indicates that risks especially exist for persons. (Risk of death, risk of injury)

Caution

This symbol indicates that risks especially exist for machines, material and the environment.

Warning regarding hot surfaces

This symbol indicates that risks especially exist for persons. (Burns)

Warning regarding hand injuries

This Symbol indicates, that risks especially for persons could be exist. (hand injuries)

The most important goal of the safety instructions is to avoid injuries to persons.

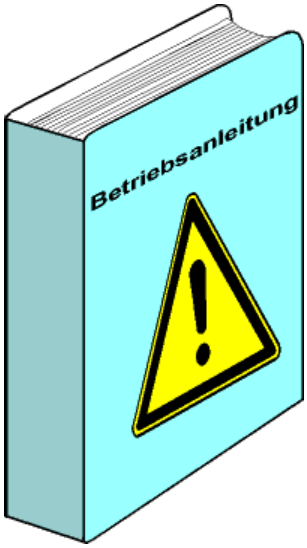
* If the warning triangle with the label "Danger" is in front of a safety note, hazards for machines, material, and the environment are not impossible.
* If the warning triangle with the label "Caution" is in front of a safety note, however, hazards for persons are not likely.

The symbol used cannot replace the text of the safety note. The text should therefore always be read completely!

2.3.0 Basic safety measures

The machine may only be operated by trained and authorized persons who are familiar with the operating instructions and can work in accordance with them!

Before switching on the machine, check and ensure that



- only authorized persons are located in the work area of the machine
- no one can be injured by the start-up of the machine!

Check the machine for visible damage before each production beginning and ensure that it is only operated in perfect condition! Immediately notify superiors of any flaws that are noticed!

Remove material/objects from the work area of the machine that are not necessary for production before each production beginning!

Check and ensure that all safety equipment works properly before each production beginning!

2.4.0 Basic safety measures during maintenance and upkeep

Observe the inspection and maintenance intervals prescribed in the operating instructions!

Observe the maintenance and repair instructions in these operating instructions

Before performing maintenance or repair work, block access to the machine by unauthorized persons! Attach or set up a notice sign that indicates maintenance or repair work!

Before performing maintenance and repair work, switch off the main switch for the power supply and secure with a padlock! The key to this lock must be kept by the person performing the maintenance or repair work!

When replacing heavy machine parts, only use suitable load-suspension equipment and sling equipment that are in good condition!

Before performing maintenance and repair work, ensure that all parts of the machine that may be touched have cooled to room temperature!

Properly dispose of environmentally hazardous lubricant, cooling, or cleaning agents!

2.5.0 Special types of risks

2.5.1 Working on the electrical equipment

Repair work on electrical equipment of the machine may only be carried out by trained electricians!

Check electrical equipment regularly!

Tighten loose connections again!

Immediately replace damaged wires/cables!

Keep the switchgear cabinet closed at all times! Only authorized persons are allowed access with a key/tool!

Never wash off switchgear cabinets and other housings of electrical equipment with a water hose!

A second person must always be present during work on voltage-conducting machine parts or cables, who can switch off the main switch in case of emergency.

2.5.2 Obey environmental protection regulations

The legal obligations for avoiding waste and proper recycling/disposal must be obeyed for all work on and with the machine.

Especially during installation, repair, and maintenance work, substances that are hazardous to water such as

- lubricant greases and oils
- acids
- coolants
- solvent-containing cleaning fluids

may not contaminate the soil or get into the sewer system! These substances must be stored, transported, collected, and disposed of in suitable containers!

3.0.0 Transport

In order to avoid damage to the machine or life-threatening injuries when transporting the machine, the following items should always be observed:

-
-
- Transport work may only be performed by persons qualified to do so and in compliance with the safety instructions.
- The machine may only be lifted by the intended attachment points.
- Only the load-suspension equipment and sling equipment listed here may be used to transport the machine.
- Also read the chapter "General safety instructions".

3.1.0 Permissible equipment and devices for transport

- The machine may only be transportedin in single components with a forklift.
- The transport forks may only be placed under the lower, horizontal frame spars.
- Also read the chapter "General safety instructions"

4.0.0 Setup

When setting up the machine, the following safety instructions must always be followed – this prevents life-threatening injuries, machine damage, and other property damage.

-
- The setup work - assembly and installation of the machine – may
- only be performed by qualified persons and in compliance with the safety instructions.
-
- Before beginning setup work, the machine should be inspected for transport damage.
-
- Ensure that only authorized persons are in the work area and that no other persons are endangered by the setup work.
-
- All machine connections - cables, hoses, and pipes – must be placed so that there is no danger of tripping.
-
- Also read the chapter "General safety instructions".
-

4.1.0 Environmental prerequisites for setup

- Ensure that power and compressed air connections are or will be installed in the immediate vicinity of the setup location of the machine.

5.0.0 Commissioning

Commissioning of the machine will be performed solely by HADI – fitters. Independent commissioning of the high voltage testing unit is not permissible, as this will void any warranty claims.

In order to prevent damage to the machine or life-threatening injuries during the commissioning of the machine, the following items should always be taken into consideration:
- The machine may only be commissioned by persons qualified to do so and in compliance with the safety instructions.
- Before the first start, check whether all tools and foreign parts have been removed from the machine.
- Activate all safety equipment and emergency stop circuits before commissioning.
- Also read the chapter „General safety instructions“.

The following special risks should be taken into account during the commissioning of the machine:
- Faulty connections can cause unexpected starting of the machine/uncontrolled machine movements.
- Reversed connections cause the motor to run in the wrong direction – this can lead to serious machine damage.
- Improperly wired connections can destroy the electrical/electronic components.
- Electrostatic procedures/electrical disturbances can endanger the electronic components and also lead to faults in the software.

5.1.0 Install supply and disposal connections

The supply connections should only be connected by experts or workers that have been trained by HADI.

5.2.0 Make basic settings

The machine is delivered in a preset condition.
Any settings will be made by HADI – fitters during commissioning.

6.0.0 Operation

The operation or switching on of the machine is explained in short steps in the following:

6.1.0 Description of the operating elements

Touchscreen

Control light manual mode

EMERGENCY STOP reset

Control light for automatic mode

Emergency stop switch

Automatic mode button

Hand- and automatic mode stop button

Manual mode key switch

6.2.0 Start preparations

Switchgear cabinet

Main switch

Emergency stop switch

Temperature controler

Switch for temperature controlers

Operator´s panel

- Switch on the main switch on the switchgear cabinet
- Reset the emergency stop switch with the initialization button (button must illuminate white)
- Compare temperature values with set value if the values have been achieved.
- The oxides must be removed from the lead melting furnace. It is important to ensure that the oxides in the pump tube are also removed.
- The lead level in the melting furnace should be checked and refilled if necessary until the middle of the weld.
- The oxides from the tin bath must be absorbed.
- The level of the tin bath has to be checked and if necessary filled up to 5 mm below the tub edge.
- Remove and clean the drainage channels.
- When installing the drainage channels ensure that they are positioned under the mold.

- Clean mold with a brass brush.
- Remove lead residues and then re-corking the mold.
- Check the filling level of the Flux bath.
- Make a manual test cast and scrape the inlet channels free.

6.3.0 Switch on the machine

- Drive machine in index position.
- Switch on automatic mode (green light must shine).

6.4.0 Possible faults and their elemination

In automatic mode, the machine is not running:

- A limit switch has not been approached and thus the program flow is disrupted.

Machine can not be started in automatic mode:

- The machine is not being driven completely into index position.

Lead pumps do not work:

- The temperatures are not reached.
- The selector "Without lead pump” is turned on

Activation of an EMERGENCY STOP switch immediately stops the entire machine. After activation of the EMERGENCY STOP switch, the EMERGENCY STOP switch must be reset with the EMERGENCY STOP reset button on the operator's panel to start the machine.
Only then is the machine ready for operation again.
The transport functions of the machine can also be used manually by means of its operator's panel. High voltage testing is not possible, however. The EMERGENCY STOP switch always works.

Warning regarding hot surfaces

Warning regarding hand injuries

Warning regarding hot surfaces

7.0.0 Converting the machine

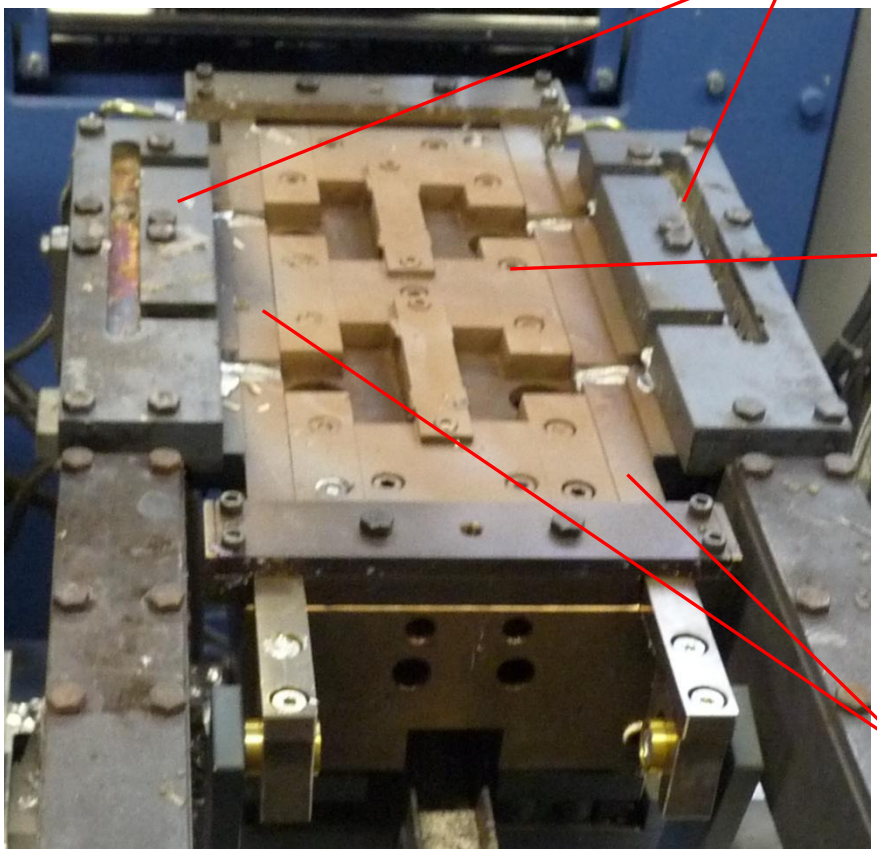
The machine is stopped by opening its door.
It must be ensured, that only qualified personnel performs this work and that the personnel has the necessary protective equipment. There is a risk of injury (crushing, cut injuries) and misuse results in a danger of damaging the machine.

Bypassing the door contact is prohibited!

7.1.0 Changing mold engraving for BS-sets:

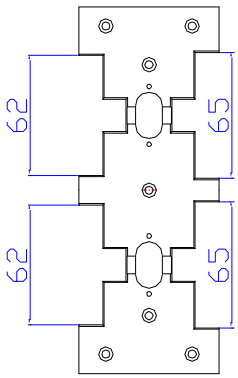
7.1.1 Mechanical:

Switch off the heating!

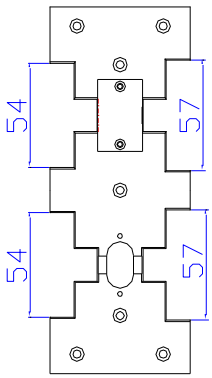


On the COS3 only BS-double sets of 2 to 8 positive plates can be produced.
To produce the different plate sets, you must change the centerpieces.
This is done by unscrewing the seven M8 screws and changing centerpiece. When screwing the new middle piece before inserting the screws must be lubricated with the copper paste, so that they can be resolved better at the next change.

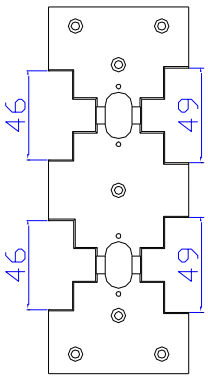
BS 8 pos.



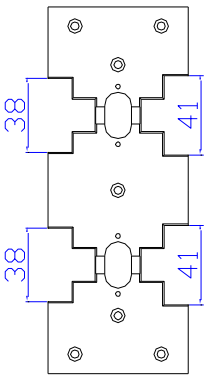
BS 7 pos.



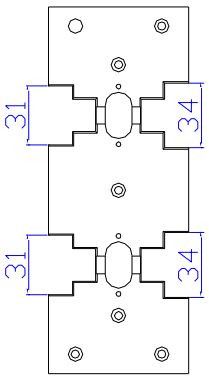
BS 6 pos.



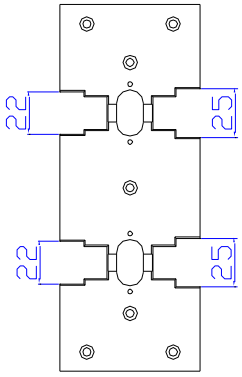
BS 5 pos.



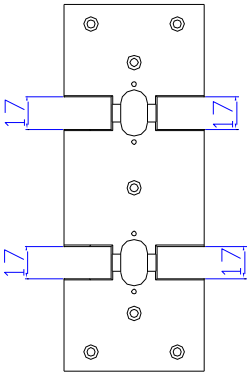
BS 4 pos.



BS 3 pos.



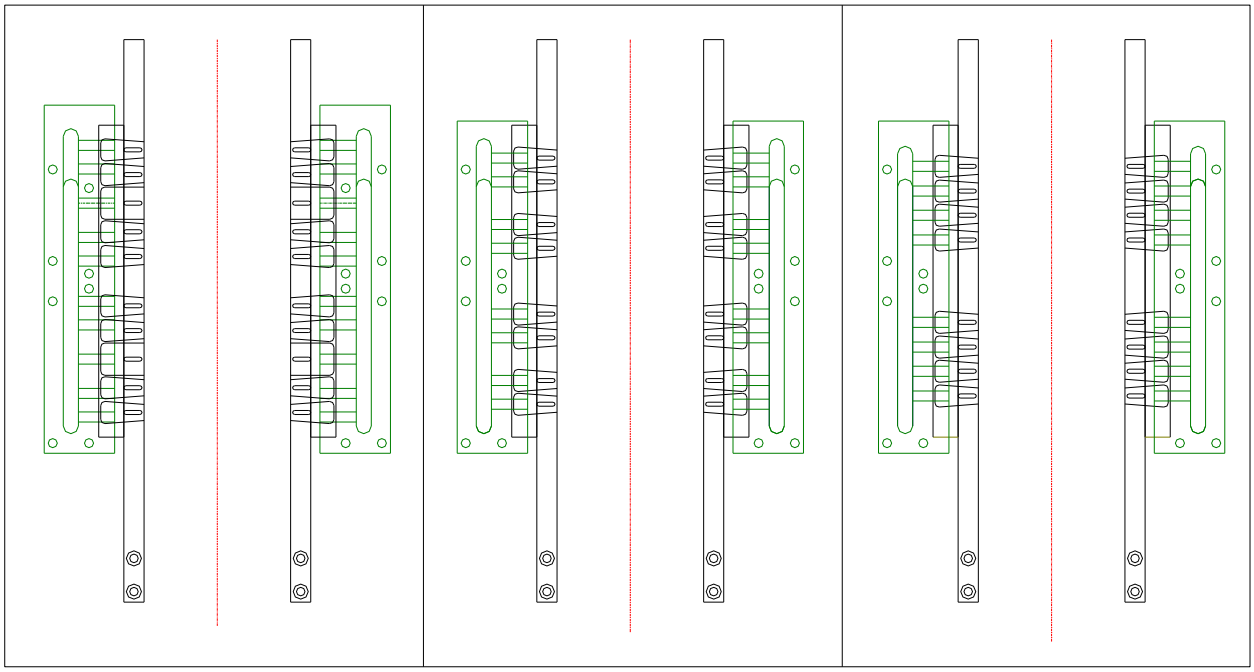
BS 2 pos.



Furthermore,you have to change the shearing bars and the inlet blocks type based
One set of shearing bars and inlet channels is available for 2,5,8 and PZS PZS 7.4 and PZS 6.3.
Changing the shearing bars is done by unscewing the guide pieces.
Thereafter, the shearing bars can be removed and replaced.

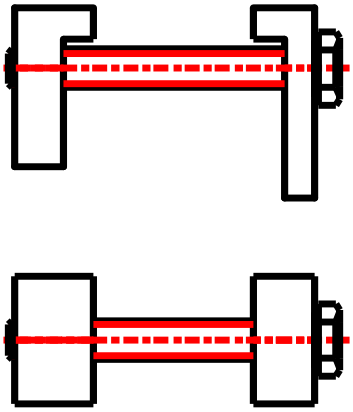
Thereafter, replace the guid pieces and screw them. When inserting the screws, make sure that the screws are lubricated with copper paste, so that they can be resolved at the next change better.

Pzs 8, 5, 2 **Pzs 7, 4** **Pzs 6, 3**

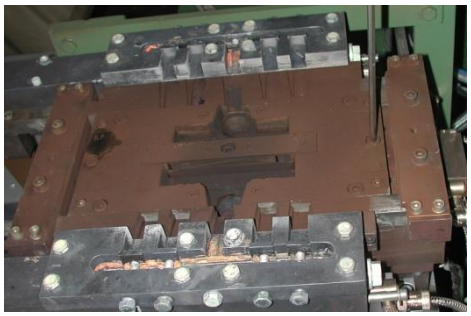


Unscrew the inlet blocks from the inlet channels and change them.
When inserting the screws, make sure that the screws are lubricated with copper paste, so that they can be resolved better at the next change.

If there will be made a type change in the type Pzs7 and Pzs 4 or Pzs2, 5 and 8 or Pzs 6 and 3, only the supplied locking parts are screwed into the appropriate place to prevent a flowing in of lead.



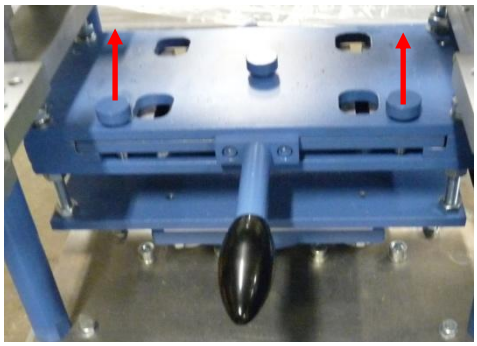
Cleaning the mold with a brass brush



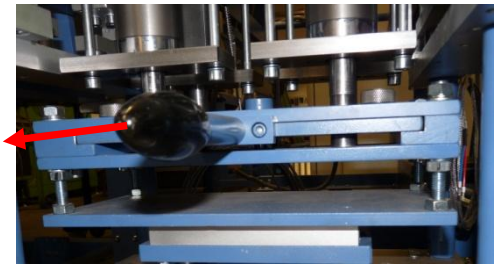
Insert and screw required middle section.
(5 x M8 socket screws)

Important: Grease srews!

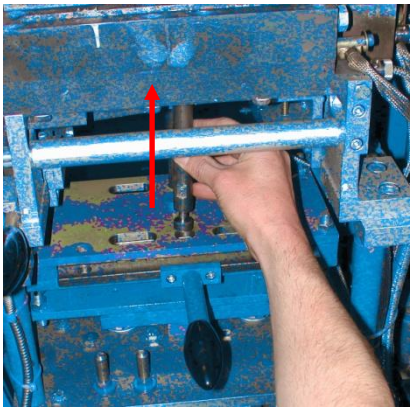
If necessary change ejector
(at the other pole length)



Remove bolts (2)



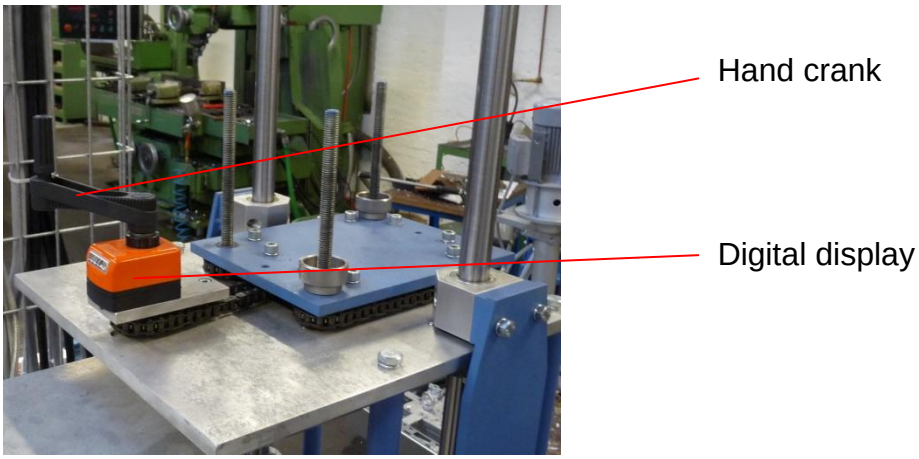
Pull out the ejector plate to the stop
(middle bolt)
The middle bolt is not removed



Remove ejector by lifting, use other ejector, push ejector plate to stop and mount the two previously removed bolts again

Setting the plate set hight

- The lifting and swiveling unit must be set with the crank and the digital display to the right plate set level.



7.1.2 Control panel

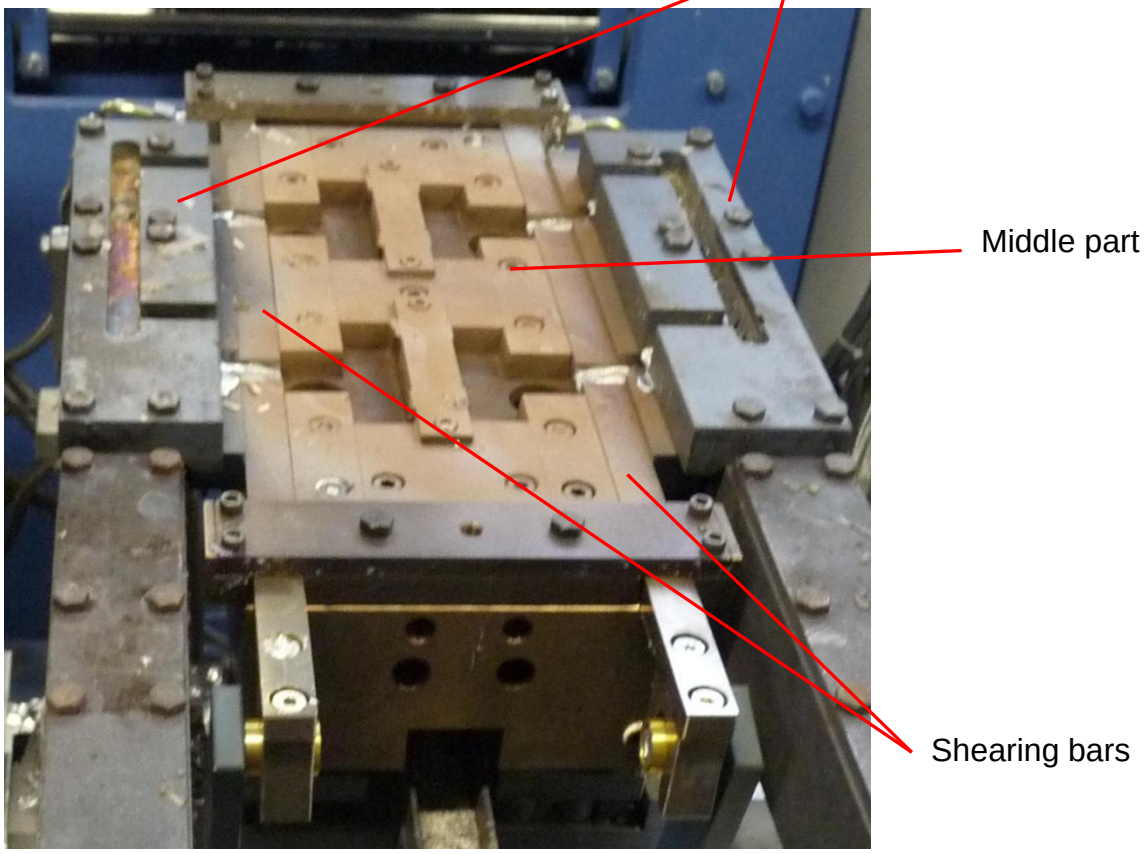
If necessary adjust temperature (main switch cabinet)

Change in thermal parameters of tin bath, mold, feed channels and melting device, so when using a different alloy composition or a change of environment parameters, the function of the machine is ensured.

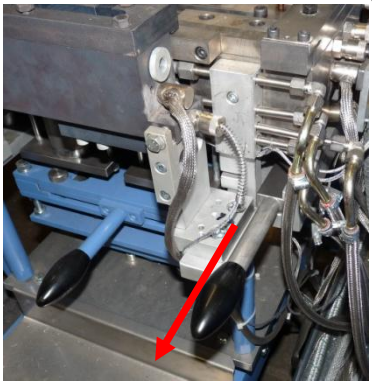
7.2.0 Change the mold

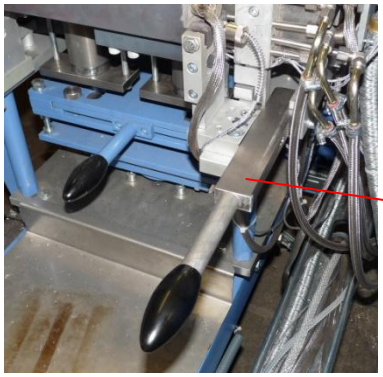
7.2.1 Mechanical:

Switch off the heating!

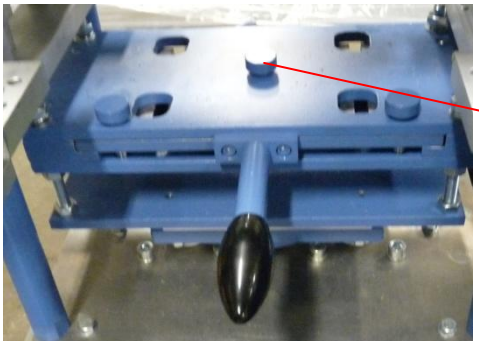


1. Pull out the locking

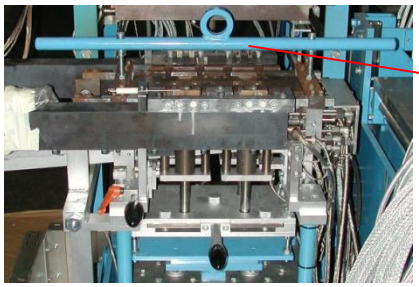




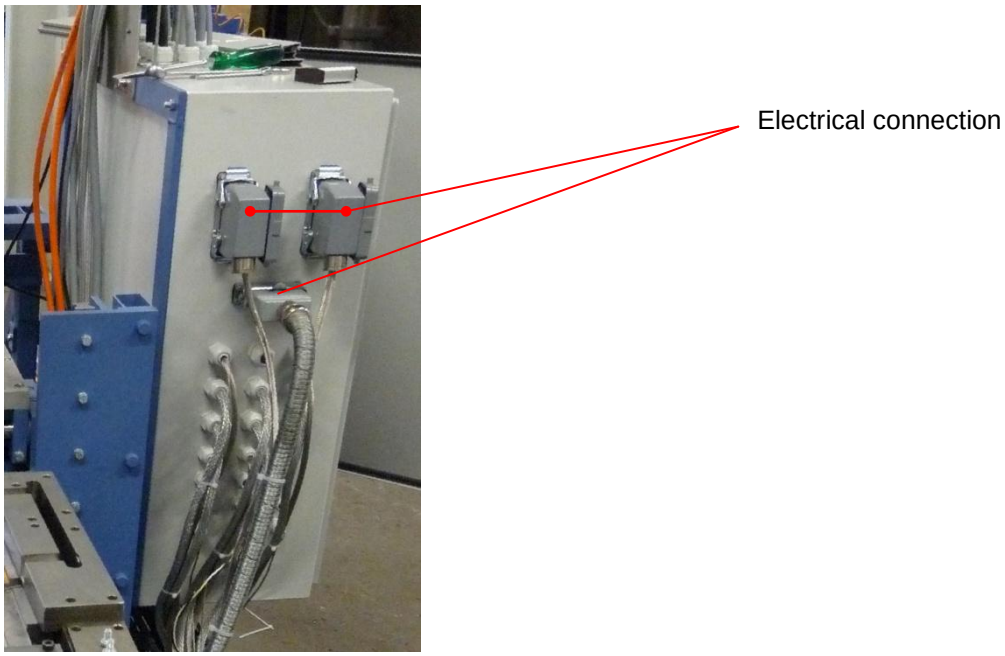
2. Remove middle bolt



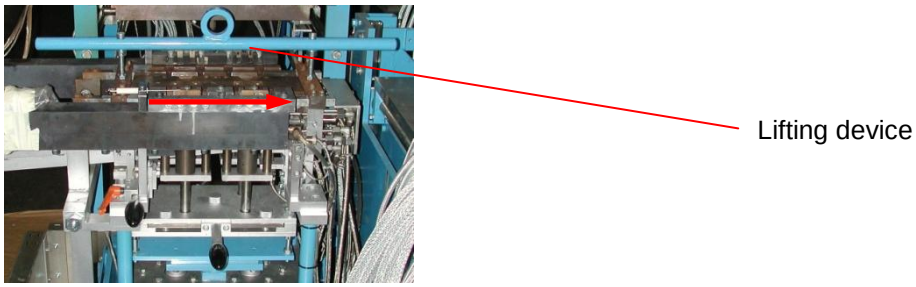
3. Screw lifting device



4. Disconnect electricity and water connections



5. Push mold to the inlet side

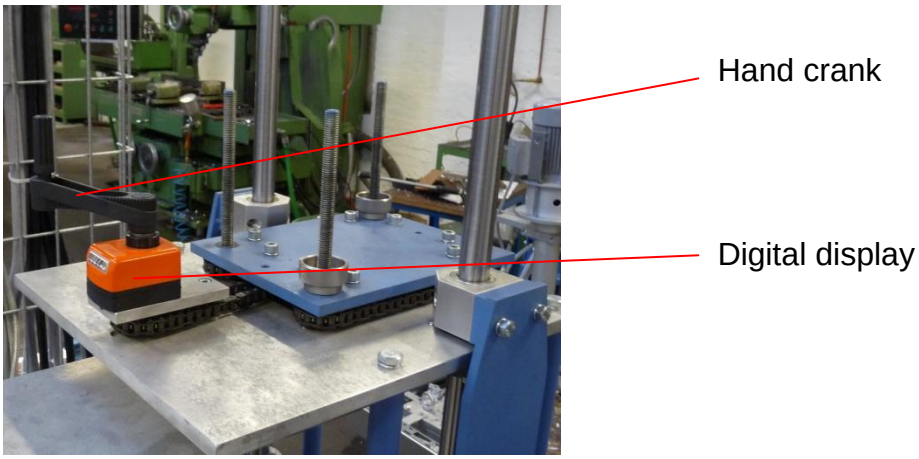


6. Hang the lifting device in crane and lift the mold carefully.

Assemble in reverse order

Setting the plate hight

- The lifting and swiveling unit must be set with the crank and the digital display to the right plate set level.



7.2.2 Control panel

If necessary adjust temperature (main switch cabinet)

Change in thermal parameters of tin bath, mold, feed channels and melting device, so when using a different alloy composition or a change of environment parameters, the function of the machine is ensured.

8.0.0 Maintenance

In order to prevent damage to the machine or life-threatening injuries during the maintenance of the machine, the following items should always be taken into consideration:

- Cleaning, lubrication, and maintenance work may only be performed by authorized operating personnel. The operating instructions must be followed exactly.

- Repair work may only be performed by authorized specialized personnel. The accident prevention regulations must be complied with.

Secure the entire work area before beginning with maintenance work.

- All work on the electrical equipment of the unit may only be performed by trained electricians.

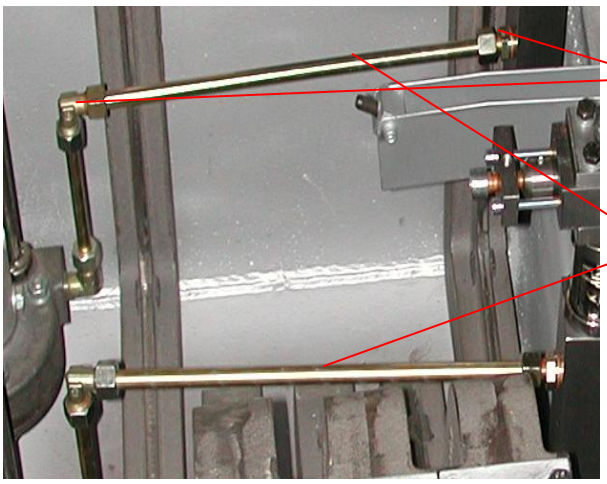
- All actions regarding the control program of the unit may only be performed by HADI.

- Also read the chapter "General safety instructions"

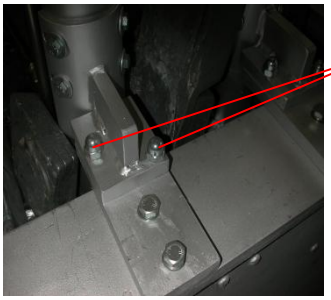
8.1.0 Dismounting of the lead pumps

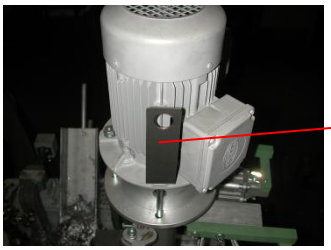
<u>Attention:</u> In assembly work, cleaning or maintenance work on the form or in the lead melting device be sure to wear protective clothing! This should consist of an apron and gloves for burns and protective glasses!

To remove the pump, it is necessary to draw lead from the melting device to uncover the upper tube fittings.
Loosen the fittings oft he horizontally pipes and remove them.



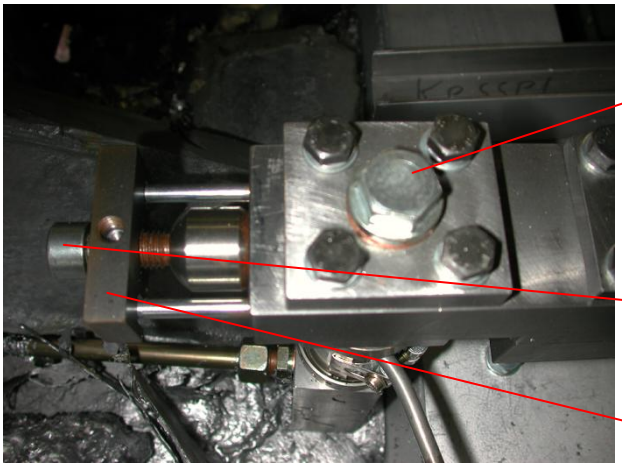
Fasten pump with mounting brackets on crane and undo screws of pump. Lift out pump slowly by crane.





8.2.0 Cleaning of the lifting tubes and inlet channels

The feed troughs and tubing should be cleaned at regular intervals of lead oxides. This is a smooth process and a good casting quality requirement.



Remove the bolt and pierce the lifting tube with a strong wire.

Loosen screw

Take away the fixing plate with attachments.
The same operations on the other side of the inlet channel.
Now you can pierce the feed channel with a robust wire and cleaned it.

8.3.0 Cleaning and lubrication

	Hourly cleaning	Daily cleaning	Weekly cleaning	Monthly cleaning	Cleaning as needed	Lubricating and greasing
Chains and sprockets			**X**		**X**	**as needed**
Guide rail			**X**			
Guide carriage			**X**			**weekly**
Threaded spindles			**X**			**as needed**
Optical sensors		**X**				
Cylinder unit			**X**			
Entire machine			**X**			
Cleaning the tin bath	**1/2h**				**X**	
Control level oft in bath	**1/2h**					
Cleaning melting furnace from lead oxides	**1h**				**X**	
Control level of melting furnace	**1h**					
Check mold condition; if necessary coat with cork	**1h**					
Control level of flux bath		**X**				
Control pneumatik maitenance unit		**X**				
Check heaters and thermo sensors for proper fit			**X**			

8.4.0 Inspections and preventive maintenance

- Inspections and preventive maintenance may only be performed by specialized personnel or by persons trained by HADI.

8.5.0 Repair

- Repairs may only be performed by specialized personnel or by persons trained by HADI.

9.0.0 Decommissioning

When decommissioning the machine, the following safety instructions must be followed – this prevents life-threatening injuries, property damage, and also environmental damage.

- Decommissioning of the unit may only be performed by authorized specialized personnel.
- Ensure environmentally sound disposal of operating fluids.
- The individual components of the unit may only be lifted by the intended attachment points.
- Only the load-suspension equipment and sling equipment listed here may be used to lift the unit.
- A total weight of 2000 kg should always be assumed for selecting suitable load-suspension equipment.
- Also read the chapter "Transport".
- Also read the chapter "General safety instructions".