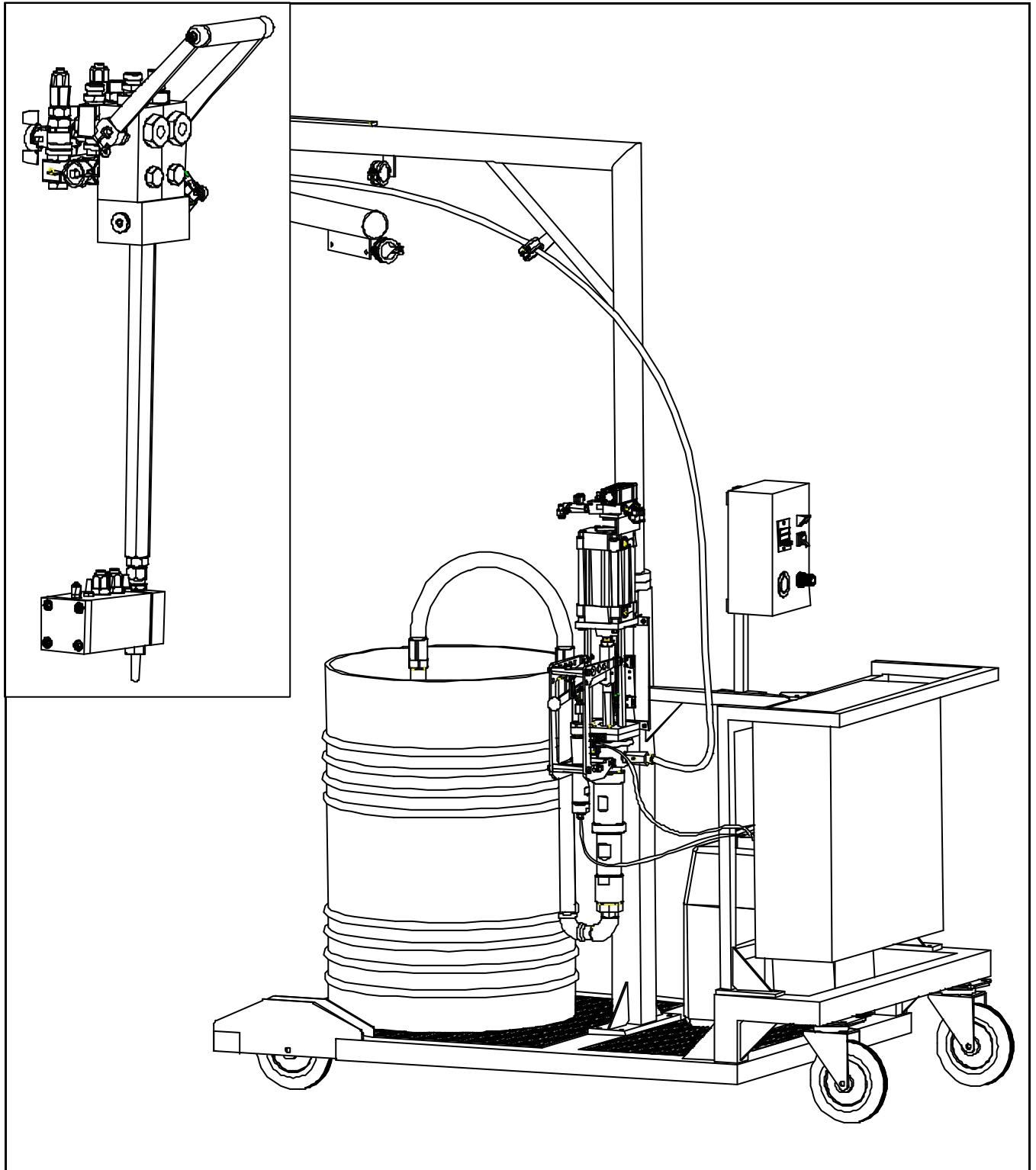


Operating Instructions

Injection RTM Plant Recirculation



- Read the instructions first!
- Display them at working place!



This plant to be operated by trained staff only!


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Technical Data

Machine	Injection RTM Plant Recirculation	
	100/80/69/11	125/120/150/11
Type	100/80/69/11	125/120/150/11
Version	Cart with 2-piece boom / Compact version	Cart with 2-piece boom / Compact version
Dimensions (L, W, H)	1340mm x 800mm x 2300mm	1340mm x 800mm x 2300mm
2-piece boom (stretched length)	3500mm	3500mm
Weight	1600N	1600N
Power	Compressed air 	Compressed air 
Allowed pressure of entering air	16bar	16bar
Allowed working pressure	8bar	8bar
Power A-pump	Air motor 100 x 80	Air motor 125 x 120
▪ Delivery volume	▪ 69ccm / DH	▪ 150ccm / DH
▪ Theoretical pressure transmission	▪ 16:1	▪ 18,5:1
▪ Dosage	▪ Choker valve	▪ Choker valve
Power B-pump	Rocking lever (dosing lever) via pump combination	
▪ Delivery volume	variabel 0,7 - 2,8ccm / DH	
▪ Dosage	Adjustment of rocking lever	
▪ Way of mixing	Internal mixing	
Hose set		
▪ A-Component	HD DN 10	
▪ B-Component	HD DN 02	
▪ Air Hose	PA 12 soft	
▪ Cleaning hose	PA 12 soft	
Flushing device	Compressed air chamber max. 4,5 bar	
*) DS = double stroke		

*) DS=double stroke

Congratulations on your new **WOLFANGEL**® RTM Injection Plant.
You made the right choice because installation, maintenance and operation are simple.

 Please read this operating manual first. You will find important information for the trouble-free handling of every part of this plant.

Guarantee

Wolfangel backs all products carrying the **WOLFANGEL® trade mark with a 12 months' guarantee:**

- in case of any defects or damages caused by Wolfangel,
- in case these operating instructions were followed by you,
- in case you paid attention to further instructions and directions applying to the operation of this plant.




In cases as described above, Wolfangel will repair or replace all defective parts free of charge if those were sent, carriage paid, directly to Wolfangel or a registered Wolfangel service office.

Damages and signs of wear caused by the following points are not covered by the guarantee:

- wrong application
- wear
- corrosion
- neglect
- accident
- installation of spare parts not supplied by Wolfangel
- improper installation
- treatment and modification of the plant that affects the normal way of working

Please make guarantee claims immediately after discovery of a defect.

Please specify:

-  **Serial no.**
-  **Order no.**
-  **Exact designation of the plant**

In case of a defect within the guarantee period that cannot be traced back to a fault of production or material, the repair will be invoiced adequately.



Use original spare parts only!



- **Spare parts, which were not supplied by us, were not tested by us.**
 - Such spare parts (or accessories) can modify the prescribed characters of the Injection Plant negatively.
 - Also the safety can be affected.
 - We are not liable for defects arising by not using original spare parts.
- **There often exist special delivery terms for own parts and for foreign parts.**
 - We always offer spare parts that correspond to the latest regulations.

After-sales service

Our after-sales service helps you with your orders, if you have any questions or need some information.
Call us, fax us or write to us:


Wolfangel GmbH
Roentgenstr. 31
71254 Ditzingen-Heimerdingen / Germany

Email info@wolfangel.com



(49) 07152 – 999 200

(49) 07152 – 581 95

 The **WOLFANGEL** Injection Plant is manufactured according to the current technical position and to the recognized technical safety regulations. By improper use, there may still occur danger for body and life of the operator or third persons or objects.

Therefore, use the plant only:

- **in proper shape**
- **according to safety regulations**
- **in awareness of risk and danger**


 The **WOLFANGEL** Injection Plant is exclusively determined to the processing of


- **resin**
- **hardeners (suitable to the resin)**
- **solvents (acetone etc.)**


for the production of FRP parts.

(working temperature from 18°C to 40°C)

Any other use is not as directed.

 **The manufacturer/supplier will not be liable for failures or defects arising from other use. The user carries the full risk.**

 The use as directed also includes:
The attention to these operating instructions.

 **Before you start working with this injection plant it is necessary that you check as follows:**

- **Are the materials suitable to each other?**
- **Are the operating pressures correct?**


Industrial safety and accident prevention

Solvents and chemicals


We do not produce or sell chemicals and solvents for the processing with this plant. Therefore, we are not responsible for their effect.


Many different materials and solvents are offered (UP, PU, EP, MEKP, Isocyanat etc.). Ask the competent material manufacturer /supplier for all information about the respective materials especially with regard to:


- **handling**
- **compatibility with the sealings and the metals of this plant**

 A **safety data sheet** belongs to the solvents. You will get it from your solvent supplier.

- **Particular safety and protective measures are described therein.**
- **Please follow the recommendations given therein.**

 This plant can contain galvanized parts or aluminium parts. Halogenated carbon hydrates can, under certain conditions, react with these parts.

 **In that case, there exists explosion hazard!** Inform yourself at your material manufacturer/supplier.

 Also think of:

- **poisonous spray mist**
- **fire**
- **explosion**
- **reaction times after mixing, toxic effect of the processed material or its components to persons, animals and plants.**


Inform yourself at your material manufacturer/supplier.




Hardener is corrosive!




Working hygiene

 The safety data sheet of the material manufacturer informs you about measures for the working hygiene valid for the respective processing material.

- **Follow these measures!**
- **Follow the general hygiene regulations!**
- **Take care of sufficient ventilation/aeration!**


-  The noise level is under 78 dB (A).
Noise protection steps are not necessary.

-  Dispose of your waste according to the regulations of the responsible supervisory board!


Further measures for industrial safety

 **In the system of the plant, there exist high hydrostatic pressures**

- **if the pressure delivery to the pump is not interrupted**
- **if the pneumatic pressure is not relieved (by means of a relieving valve)**
- Never exceed the prescribed working pressures of the system or its single components (hoses, pumps etc).
- Never have the plant run when any existing protection covers are removed.
- Before repair work, turn off the compressed air delivery first and relieve the remaining pneumatic pressure of the material by a relieving valve.

 **The pressure hoses can become loose by wear, buckling, wrong handling etc. For this reason:**

- Never tighten hoses with parts of the body, adhesive tape or other makeshifts!
- Never mend hoses!
- Loose hoses must be replaced by new ones!

 **Attention when screwing off the hoses! A blocked conduction can contain material, which still stands under high pressure. For this reason:**

- Relieve pressure by pressure relieving cock before hose and gun are detached!
- Connect to earth all system components. So, the static electricity will be diverted!
- Use the lowest possible pressure for flushing!
- Take a suitable vessel for flushing!
- If you modify the plant, you must change the type plates!

- Make sure that malfunctions, that can affect the safety, are immediately eliminated.
- Also follow the legal and any other regulations applying to accident prevention and to environmental protection.
- Every person in the factory of the user, who is put in charge with the operation, maintenance, care etc. of the plant, must have read and understood the complete operating instructions before putting the plant into operation, especially the chapter **Industrial safety and accident prevention.**
- **We recommend: Ask for a written confirmation about it.**
- Control regularly if the operating staff works in awareness of safety and dangers and if the staff observes the directions of the operating instructions. We recommend that the staff is instructed every 6 months!
- Pay attention to all directions displayed on the plant concerning safety and dangers!
- **All safety directions displayed on the plant must always be fully legible!**
- Start the plant only if all protection devices, detachable protection devices, emergency – stop (NOT-AUS) etc. are attached and fully functional!
- Take precautions by working directions!

Our recommendation:

Each technical device must be tested by a competent person for working safety at regular time intervals!

Pressure certificate for hoses

Hose type	DN 02	DN 06	DN 10
Nominal size	2	6	10
Maximum working pressure dynamic	375 bar	310 bar	240 bar
static	600 bar	495 bar	285 bar
Test pressure	1500 bar	1240 bar	960 bar
Test time	1 minute	1 minute	1 minute

The left-listed hose types are subject to a final pressure examination in the factory of our hose supplier!

Safety installations



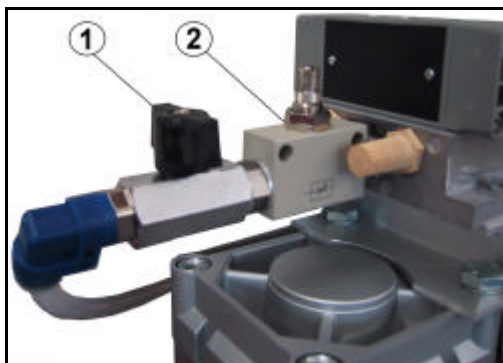
Cleaning vessel

- ① Safety valve
 - Overpressure valve
 - Valve to evacuate pressure
- ② Non-return valve
 - Secures against solvent (acetone) in the air conduction

Attention!

Daily finishing of work

- Close stop-cock
- Unpressurize cleaning vessel!
- Open the overpressure valve by pulling the ring (1)



Air motor connection

- ① Stop-cock for air motor
- ② Throttle valve to adjust the speed of the air motor

Option:

- Flow meter
- To control the even resin supply

Accessories

Supply with delivery

- special lubricant for the flushing cups of the pumps
- operating instructions
- spare part list

Supply on repeat order

- PE-hose 10x8
 - hose screw Flü14
- By these parts, the gun jet is joined to the injection opening at the mould.

With the gun you press a mixture of resin and hardener into the mould.

The materials are delivered through the hoses to the gun by compressed air, namely by the:

- **big pump for the A-component (resin)** and the
- **small pump for the B-component (hardener)**

The rocking dosing lever mechanically couples the "A"-pump and the "B"-pump (pump combination).

Advantage:

- **Misdosage is impossible, because both pumps start and stop simultaneously.**

At the bearing of the rocking lever, you can adjust the dosing ratio resin/hardener.

A pneumatic cylinder (air motor) is the driving motor for the pump combination.

The compressed air supply is done by your pneumatic network.

You can join the gun jet tightly to the injection opening of the mould by a PE-hose (clamped joint).

The fitting hose connection can be ordered at **WOLFANGEL®**.

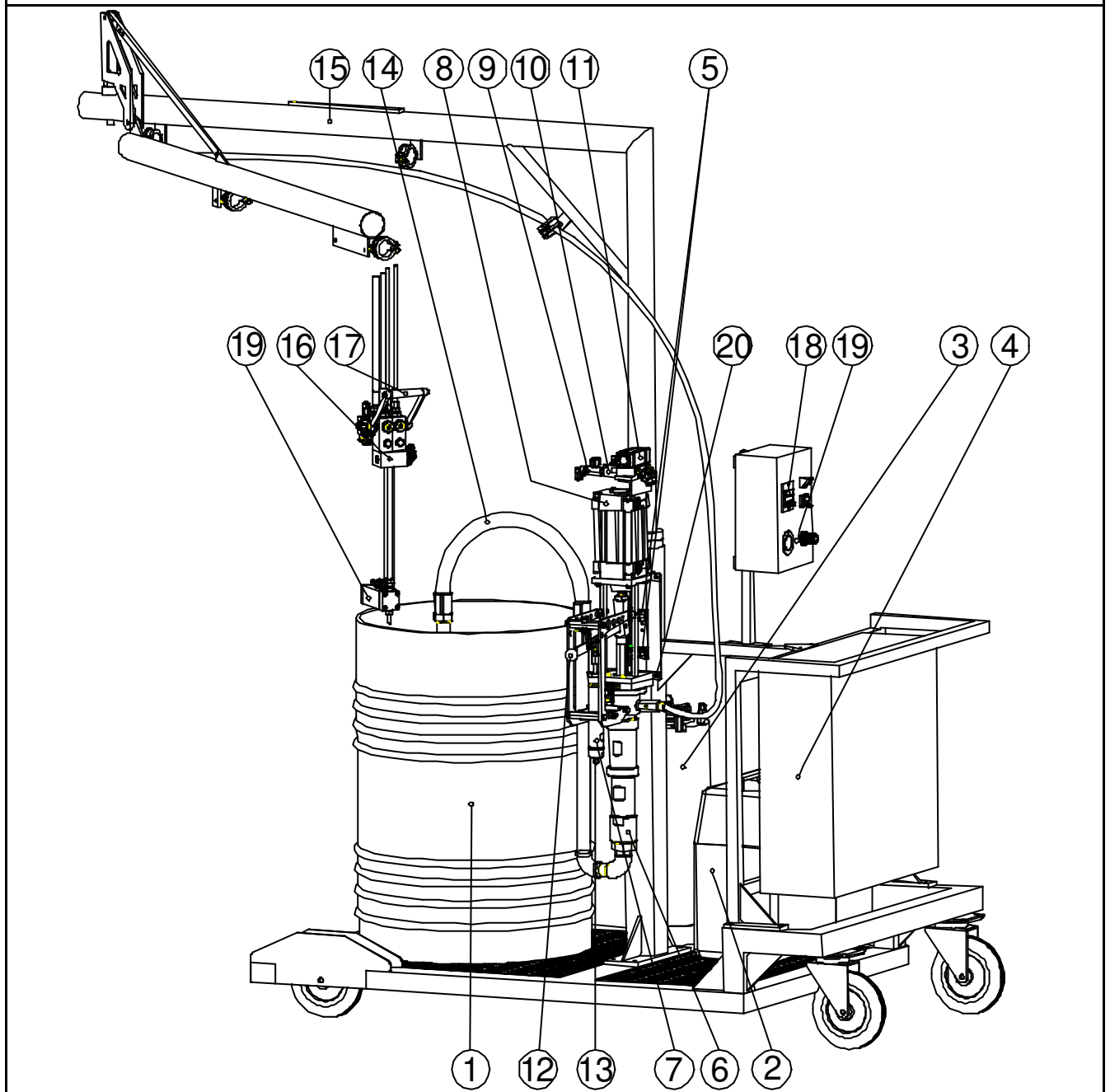
Advantages:

- **working facilitation**
- **The mixture is pressed into the mould without any loss.**

Options:

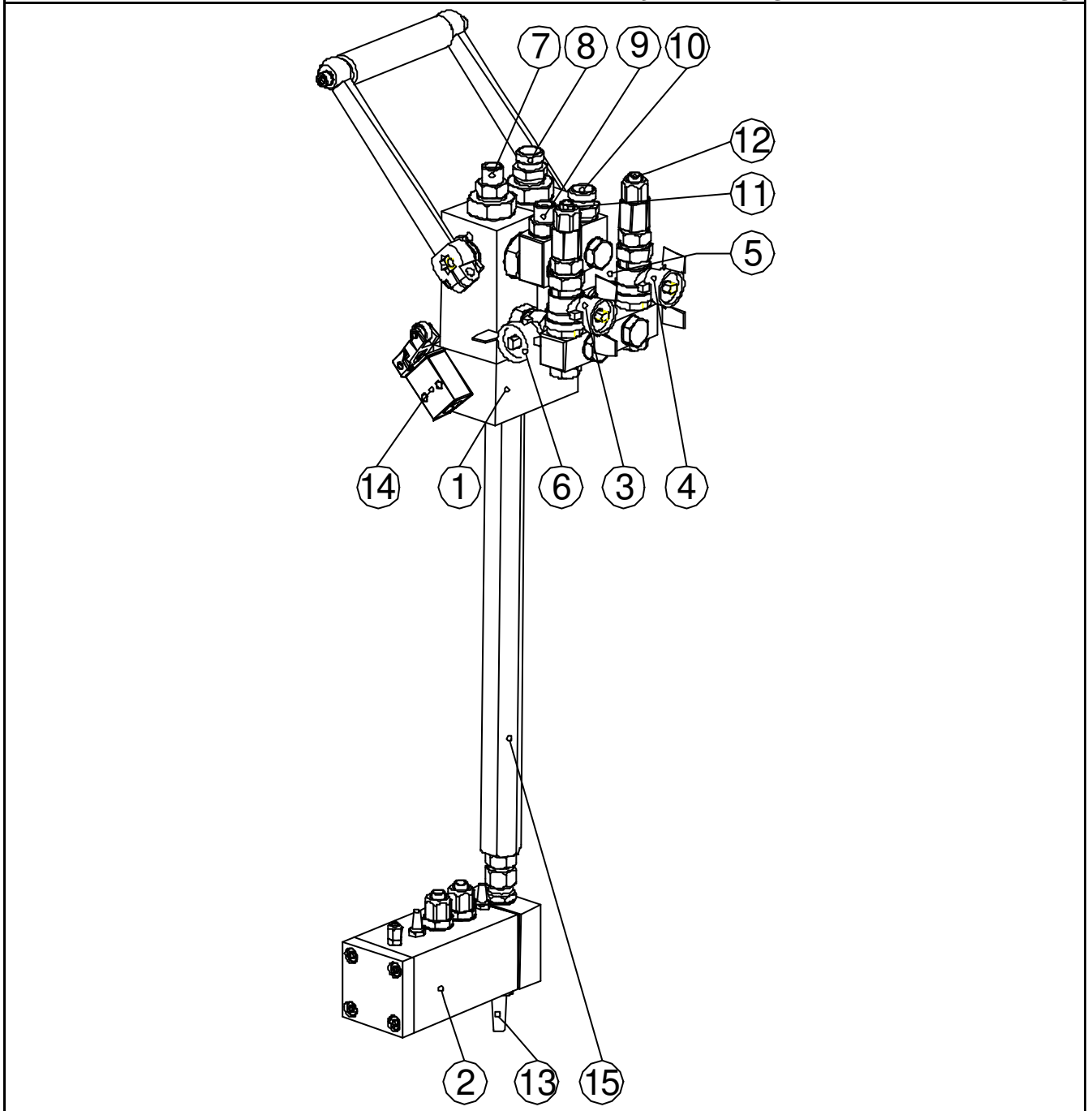
- A **quantity counter** announces when the mould is full. The required quantity is adjustable.
- A **flow meter** with scale shows you if the B-pump supplies hardener evenly at the up and down stroke.
- An **RTM pressure regulator** will hold steady the adjusted injection pressure of the material.

All these options can also be installed later.



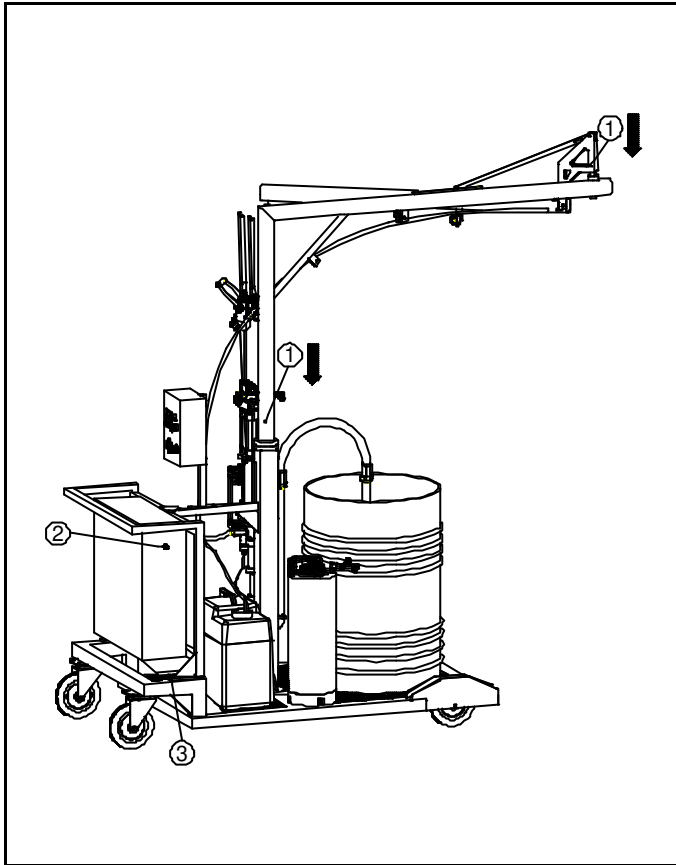
- | | |
|--|-----------------------------|
| ① Resin drum (200 l / original drum) | ⑫ Dosing lever for hardener |
| ② Hardener container (Hobbock) | ⑬ Hardener intake system |
| ③ Flushing agent container / solvent container | ⑭ Resin intake system |
| ④ Control box with pressure gauge | ⑮ Articulated boom |
| ⑤ Roller valves – up/down switch of air motor | ⑯ Injection gun |
| ⑥ A-pump for resin | ⑰ Trigger handle |
| ⑦ B-pump for hardener | |
| ⑧ Air motor | Options: |
| ⑨ Shut-off cock for the air motor | ⑱ Quantity counter |
| ⑩ Throttle valve
to adjust the speed from the air motor | ⑲ RTM pressure regulator |
| ⑪ Reversing valve to control the air motor | ⑳ Flow meter (invisible) |

Injection gun - recirculating



- | | |
|-----------------------------------|--|
| ① Injection gun | ⑨ Recirculation hardener |
| ② RTM pressure regulator (option) | ⑩ Recirculation resin |
| ③ Solvent valve | ⑪ Entry air |
| ④ Air valve | ⑫ Entry solvent |
| ⑤ Cleaning valve for resin | ⑬ Hose connecting to RTM mould |
| ⑥ Cleaning valve for hardener | ⑭ Roller valve for quantity counter (option) |
| ⑦ Entry for hardener | ⑮ Mixing pipe with insert |
| ⑧ Entry for resin | |

Delivery and installation



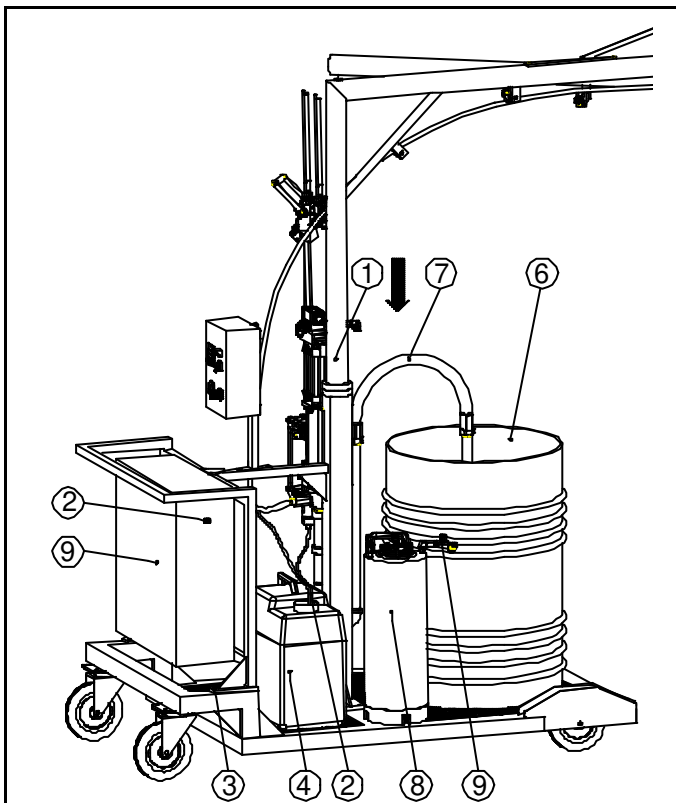
The injection plant is delivered ready for connection. You only have to set it up and to connect it:

- ① Mount the boom
- ② Connect to pneumatic network
- ③ Be sure to connect the plant to the ground!
(to protect against static charge)
- ④ Fit the hose package in the pipe clips at the boom.

- ⚠ **Ensure adequate ventilation/suction**
Take into particular account the regulations covering the maximum concentration of fumes in the workplace and the measurement and evaluation of this.

⚠ **Prevent/avoid body contact to the materials to be processed.**

Putting into operation



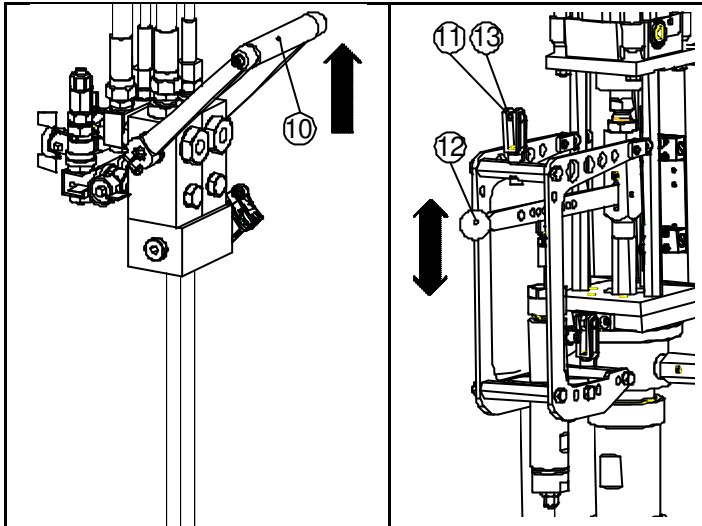
- ⚠ **Absolutely to be checked:**
Are the material guiding hoses tightly connected and are they leak-free? ⚠

- ④ Set up the hardener container (hobcock)
- ⑤ Place intake system in the container opening

- ⚠ **Caution: Hardener is corrosive!** ⚠

- ⑥ Set up the resin drum (200 l original drum)
- ⑦ Place intake fitting in the drum opening
- ⑧ Fill up cleaning vessel with solvent
- ⑨ Put the cleaning vessel under pressure

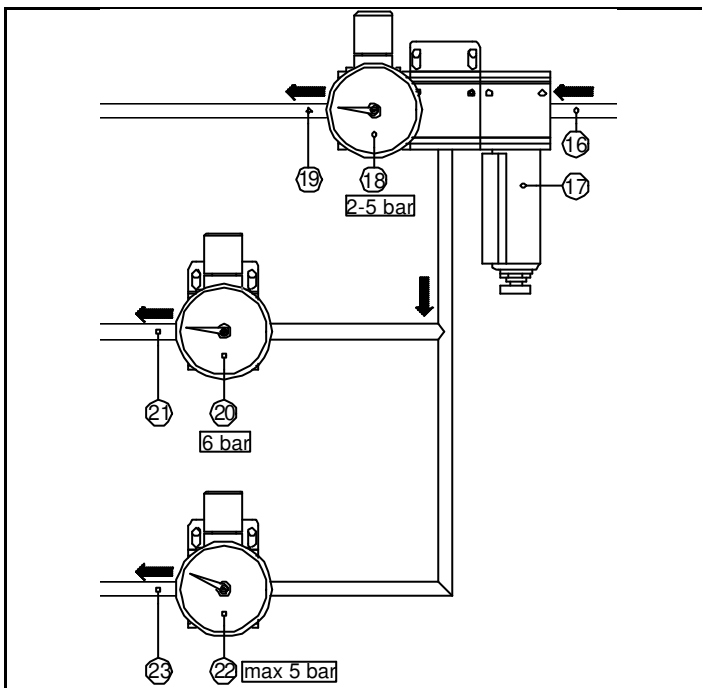
Putting into operation



Absolutely to be checked:
 Are the material guiding hoses tightly connected and are they leak-free?

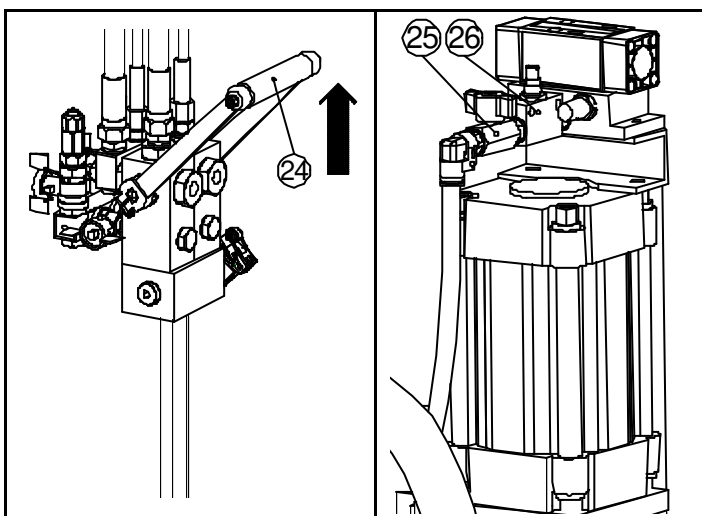
Fill up hardener circuit

- ⑩ Trigger handle at the gun in position „CLOSED“ (Recirculation)
- ⑪ Take the dosing lever off its hinge
- ⑫ Pump hardener into the circle of the hardener system until the hardener penetrates bubble-free
- ⑬ Put the dosing lever back on its hinge and lock it



Control box

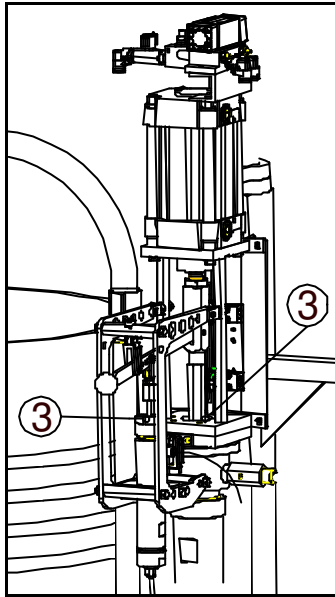
- ⑭ Turn on compressed air
- ⑮ Set working pressures
- ⑯ Feed compressed air
- ⑰ Air filter
- ⑱ Pressure regulator for air motor 2-5 bar
- ⑲ Exit to air motor
- ⑳ Pressure regulator for control air (quantity counter) 6 bar
- ㉑ Exit to quantity counter
- ㉒ Pressure regulator for cleaning vessel max. 5 bar
- ㉓ To cleaning vessel



Fill up resin circuit

- ㉔ Trigger handle at the gun in position „CLOSED“ (Recirculation)
- ㉕ Open air cock at 5/2-port-directional control valve
- ㉖ Adjust working speed on throttle air
- ㉗ Pump resin into the circle of the resin system until the resin penetrates air bubble free
- ㉘ Adjust mixing ratio (resin/hardener) at the dosing lever of the hardener pump
- ㉙ You find the mixing table on the left side of the control box

Before you start working



- ① **Check:**
 - Is the machine connected to the earth?
 - Is the mould connected to the earth?
- ② **Flush the plant and inspect for leakage**
- ③ **Fill the flushing cups of the pumps with special lubricant**
- ④ **Put up the machine at a place, where the temperature will always be at least 18°C**
- ⑤ **Check the material container:**
 - Is the material thoroughly mixed?
 - Are the containers sufficiently filled?



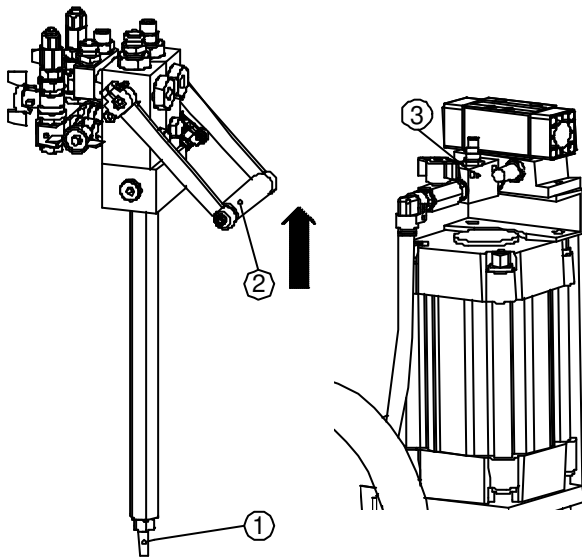
Attention:

Keep pumps, hoses and gun clean!



This guarantees a long life of your plant!

Working



- ① **Connect the mouth piece of the injection gun to the mould**
- ② **Trigger handle at the gun in position „ON“ (injection)**
- ③ **Regulate capacity of resin output on the throttle air**

Option

Quantity counter

Predetermination of filling amount

Volumetric displacement of pumps / double stroke (DS):

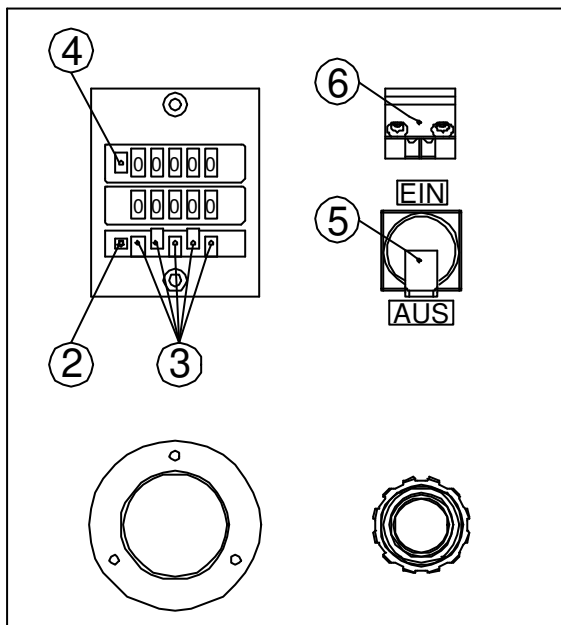
Pump	Max. volumetric displacement/DS [ml]
HP11	4,6
HP17	13
HP25	29,4
69ccm	72
100ccm	113
150ccm	150

The quantity counter gives a signal, when the mould is filled. The required quantity is adjustable.

First calculate the needed number of double strokes you have to set.

1 Formula

$$\frac{\text{Filling amount of the mould / ccm}}{\text{Volumetric displacement / DS in ccm}} = \text{Number of DS}$$



2 Unblock the setting counter

3 Set the number of double strokes

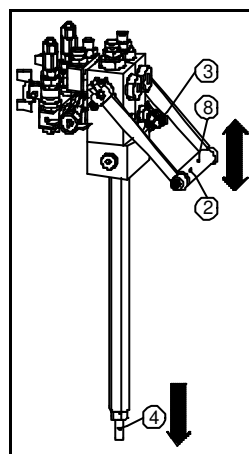
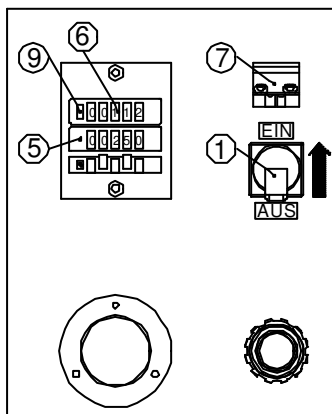
- Move the white lever in the direction shown by the arrow and hold it there
- Use the pushbuttons to enter the respective digits
- Release the white lever

4 Set control counter to zero

5 Quantity counter EIN(ON) / AUS(OFF)

6 Alarm whistle

Filling the mould



1 Turn on the quantity counter

2 Trigger handle at the gun in position „ON“ (injection)

3 The roller valve is activated

4 Resin and peroxide are pressed into the mould

5 The setting counter shows the set number

6 The control counter counts the strokes onward

7 The alarm whistle will be heard when the last stroke was counted

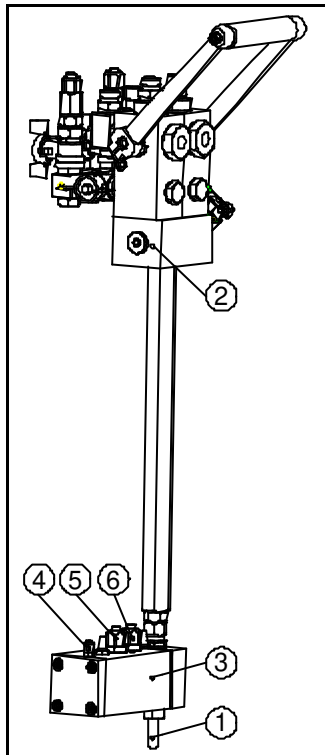
8 Trigger handle at the gun in position „CLOSED“ (recirculation)

- The material flow to the mould is interrupted
- The material is recirculating in the plant

9 Set control counter to zero again, before you fill the new mould

Option

Pressure regulator valve



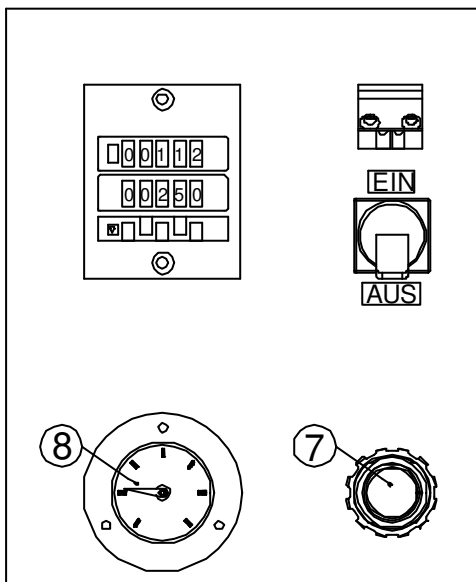
RTM pressure regulator valve is designed to make the automatic injection of an RTM mould possible without the risk of damaging the mould with excess pressure.

The injection pressure is adjustable by balancing the pressure with a preset value using a manometric system.

The speed of the pump is controlled by the pressure sensor.

It can be retrofitted to each machine standard on the market.

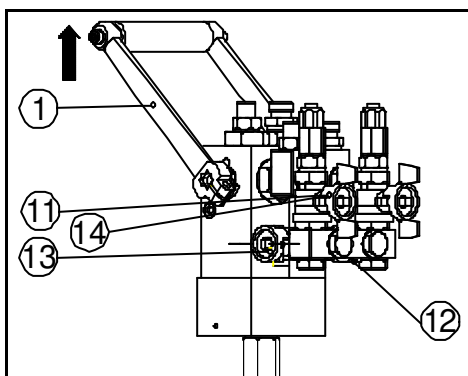
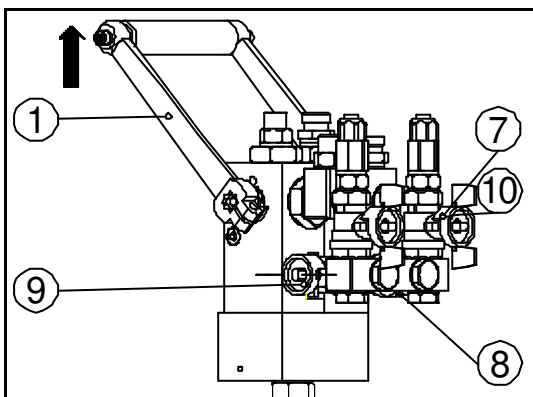
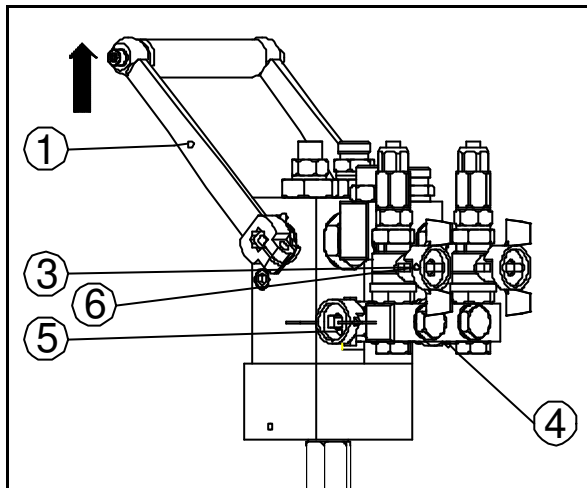
- ① Connect the injection hose
- ② Injection gun recirculating
- ③ Pressure regulator valve
- ④ Connection injection pressure
- ⑤ Air supply from the network
- ⑥ Exit to the air motor
- ⑦ Pressure regulator for the injection pressure
- ⑧ Manometer for the injection pressure



Flushing

You can regenerate soiled solvent by distillation and reuse it after this process!

WOLFANGEL® supplies suitable distilling devices.



Flush after each working process!

(Consider the pot time / gel time!)

Never flush on the floor!

Collect the remaining mixture and the flushing agent in a suitable container only!



After the injection

- 1 Trigger handle at the gun in position „CLOSED“ (recirculation)**

The material flow to the gun is interrupted

- 2 Pull off the gun from the mould**

Blow out the remaining material

- 3 Open the air valve:**
The air stream blows the residue out of the gun. You save solvent.



Flush the resin / peroxide channel separately!

- 4 Open the cleaning valve for the resin:**
The air stream blows the residue out of the resin conduction hose.



- 5 Open the cleaning valve for peroxide:**
The air stream blows the residue out of the peroxide conduction hose.



- 6 Close the air valve**



Flush the gun

- 7 Open the flushing agent valve:**
The solvent cleans the respective channel



Flush the resin / peroxide channel separately!

- 8 Open the cleaning valve for resin:**
The solvent cleans the resin channel



- 9 Open the cleaning valve for peroxide:**
The solvent cleans the peroxide channel



- 10 Close the flushing agent valve**



Dry-blow the gun

- 11 Open the air valve**



- 12 Open the cleaning valve for resin:**
The air stream dry-blows the channel



- 13 Open the cleaning valve for peroxide:**
The air stream dry-blows the channel



- 14 Close the air valve**



- All cleaning valves must be closed before you fill a new mould!**
The mixture will not be soiled by solvent.

End of work

- ① **Trigger handle at the gun in position „CLOSED“**
(recirculation)
- ② **Close the air cock**
- ③ **Close the piston rod, when you close it, it must always be in lower position**
No deposits on the piston rod
- ④ **Control the flushing agent cups at the pumps**
Fill up, if necessary
- ⑤ **In the evening, disconnect the plant from the compressed air network!**

In case of a stand-still of the plant for a longer period of time (weeks/months):



- Flush the resin system thoroughly with solvent
- Fill the system



This guarantees a trouble-free putting into operation after a longer stand-still!

Flushing of the plant

How often you have to flush the plant depends on

- **the processing materials** and on
- **the general working conditions**

The flushing program should correspond to your production conditions:

- **e.g. daily when using fast-drying or water-hydrous materials**
- **less often under other conditions**

Always flush:



- **before material change**
- **if you use other solvents at material change**
- **before the weekend**
- **before a longer standstill of the plant**



(company holidays, etc)

This guarantees a long life of the plant!

Flushing the plant

Plant is in recirculation mode

- ① Decrease the working speed on the throttle valve
- ② Close the air cock at 5/2-port directional control valve
- ③ Take the intake system for the resin and the hardener out of the respective containers
- ④ Let the recirculation hoses in the containers
- ⑤ Open the air cock at the 5/2-port directional control valve
- ⑥ Pump the material out of the plant
- ⑦ Close the air cock at the 5/2-port directional control valve

Let the solvent circulate through the plant

- ⑧ Put the intake pipes into different buckets with solvent, otherwise contamination of the resin channel with hardener and inverse
- ⑨ Put the recirculation hoses into waste bins
- ⑩ Let the solvent run through the hoses

Fill up the buckets with new solvent

- ⑪ Put the recirculation hoses to the intake system
- ⑫ Let the solvent circulate again through the plant
- ⑬ Change the solvent against clean one after some minutes
- ⑭ Flush the plant once again, until clean solvent comes out of the recirculation hoses
- ⑮ Close air cock at 5/2-port directional control valve
- ⑯ Piston rod must be in lower position
No deposits on the piston rod
- ⑰ Disconnect the plant from compressed air network
- ⑱ Leave the plant standing filled with solvent

Putting into operation

- ⑲ Evacuate solvent
- ⑳ Put intake system in material containers
- ㉑ Put the recirculation hoses into waste bins
- ㉒ Turn on the pump for a short time and have the plant circulated with the material to be processed
- ㉓ Put the recirculation hoses into material containers



You can regenerate soiled solvent by distillation and re-use it after this process!



WOLFANGEL[®] supplies suitable distilling devices.

Maintenance and care

- !** Before maintenance works, turn out the compressed air delivery first and evacuate the banked-up pressure of the remaining material: **!**
- Injection gun in recirculation mode

The injection plant is easy to maintain, if you follow the below -listed instructions:

After every working process:

- Flush the gun

Daily:

- Empty the water separator
- Check the flushing cups and, if necessary, re-fill with lubricant (accessory). (Wear reduction)

In case of material change or longer stand-still:

- Flush the plant

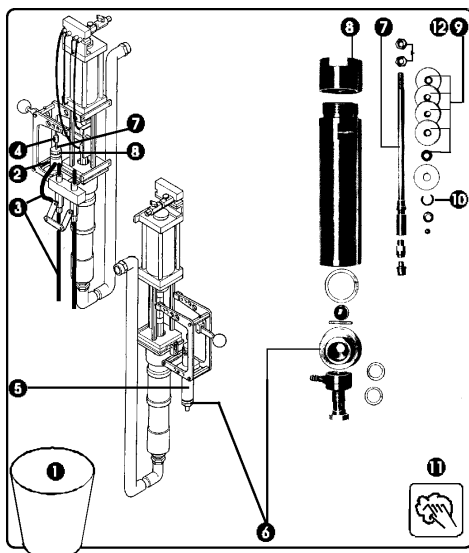
- !** Always keep the plant clean! **!**

Then it will run for years without malfunction!

Repair / Exchange of Parts

Only trained staff is allowed to carry out the following jobs:

- !** Before repair works, turn out the compressed air delivery first and evacuate the banked-up pressure of the remaining material: **!**
- + through the gun or
 - + through the relief valve



Packing change at hardener pump:

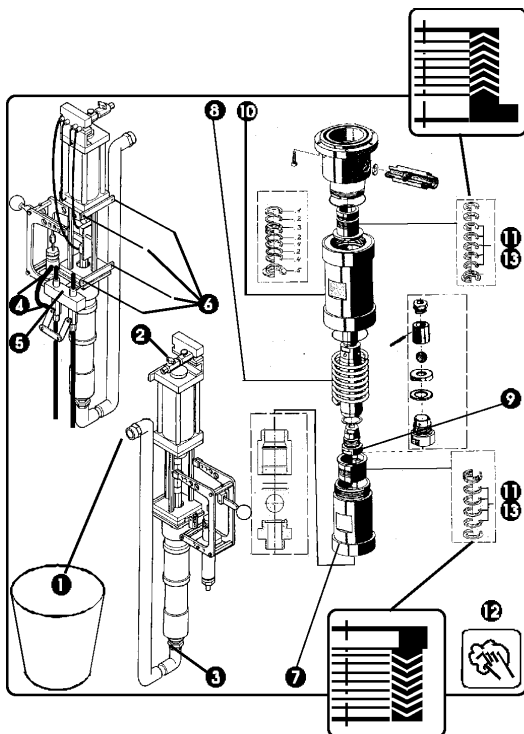
- if the pump does not run properly / evenly any more and/or
- if material penetrates at piston and packings

- 1 Empty the material system by pumping
- 2 Relieve pressure over pressure relief cock
- 3 Release all hose connections
- 4 Separate piston rod from fork-shaped piece
- 5 Release pump from holding device
- 6 Release foot valve
- 7 Press out piston rod downwards
- 8 Remove upper part of pump
- 9 Remove upper packing set (5 pieces)
- 10 Remove packing ring and centring ribbon at piston rod
- 11 Clean all parts
- 12 Install new packing set
- 13 Assemble in reverse order!

- !** Pay attention to the packings!
! Clean and grease the screw thread!

Repair / Exchange of parts

For Type 100/80/69/11



Packing change at material pump 69 ccm

- if the pump does not run properly / evenly anymore and/or
- if material penetrates at piston and packings

- 1 Empty the material system by pumping
- 2 Cut the compressed air supply at the pneumatic cylinder
- 3 Release the cone screwing (suction)
- 4 Release all hose connections of the hardener pump
- 5 Detach distribution block from the plant
- 6 Separate pump combination from the plant and clamp into a vice
- 7 Release pressure cylinder and screw off
- 8 Remove the spring
- 9 Screw off piston rod with spanner plain
- 10 Release spring housing and screw it off
- 11 Remove old packings



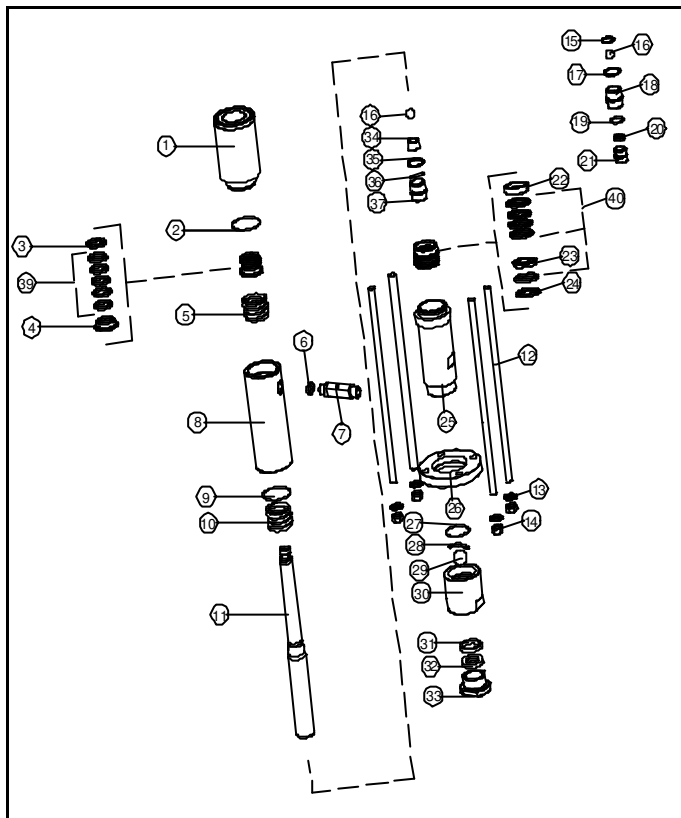
Attention: Do not exchange bearing rings!

- 12 Clean the parts
- 13 Install a new packing set (with bearing rings)
- 14 Assemble in reverse order!



- Pay attention to the packings!
- Clean and grease the screw thread!

For type 125/120/150/11



⚠ Change the packing at the material pump 150ccm

- if the pump does not run properly / evenly anymore and/or
- if material penetrates at piston and packings

- 1 Empty the material system by pumping
- 2 Cut the compressed air supply at the pneumatic cylinder
- 3 Release the cone screwing (suction).
- 4 Detach recirculation block from the pump exit
- 5 Separate pump from the machine and clamp into a vice
- 6 Release bottom valve and screw it off
- 7 Release nuts at tie rods
- 8 Remove upper part and pressure cylinder carefully.

⚠ Springs under tension!

- 9 Remove springs, bearing rings and Piston
- 10 Remove old packings

⚠ Caution: Do not exchange bearing rings! Do not exchange double saddle ring unless it is damaged (not a wear part)!

- 11 Clean the parts
- 12 Install a new packing set (with bearing rings)
- 13 Assembly in reverse order!

- ⚠**
- Pay attention to the packings!
 - Clean and grease the screw thread!

Elimination of defects (list how to find the defect)

Problem	Reason	Repair
Pump does not work	<ul style="list-style-type: none"> ▪ Air supply is insufficient or hose conductions are blocked ▪ Air pressure is insufficient or air valves are closed or blocked ▪ Air valves or material valves or packings are damaged ▪ Material container is empty 	<ul style="list-style-type: none"> ▪ Increase air supply, clean the hose conductions, check air pressure ▪ Increase air pressure, clean blocked material hoses or valves ▪ Replace valves or packings ▪ Fill up material container or flush
Pump works, but material amount is too low at both components	<ul style="list-style-type: none"> ▪ Air supply is insufficient or hose conduction are blocked ▪ Material hoses or valves or gun are blocked ▪ Material container is empty ▪ Air valves or material valves or packings are worn out or damaged ▪ Packing screw nut is loose or packing is damaged ▪ Hardened material at piston rod 	<ul style="list-style-type: none"> ▪ Increase air supply, clean the hose conductions, check air pressure ▪ Clean with cleaning agent ▪ Fill up or flush ▪ Replace valves or packings ▪ Draw up packing screw nut or replace packing ▪ Clean the pump, always stop at lower switching point
Pump works, but material amount is too low at downstroke	<ul style="list-style-type: none"> ▪ Material valves or packings are worn out or damaged ▪ Foot valve is soiled 	<ul style="list-style-type: none"> ▪ Replace valves or packings ▪ Clean with cleaning agent ▪ Wolfangel® -Service, if necessary
Pump works, but material amount is too low at upstroke	<ul style="list-style-type: none"> ▪ Material valves or packings are worn out or damaged ▪ Piston valve is soiled 	<ul style="list-style-type: none"> ▪ Replace valves or packings ▪ Clean with cleaning agent or check ▪ Wolfangel® -Service, if necessary
Plant works unevenly	<ul style="list-style-type: none"> ▪ Material container is empty ▪ Material valves are open or soiled ▪ Material piston or packings are open or worn out 	<ul style="list-style-type: none"> ▪ Fill up ▪ Clean with cleaning agent ▪ Wolfangel® -Service, if necessary
Material escapes at piston rod upwards	<ul style="list-style-type: none"> ▪ Packings untight 	<ul style="list-style-type: none"> ▪ Tighten upper part of pump till no material comes out
Mixture is not correct	<ul style="list-style-type: none"> ▪ Hardener channel in injection gun is blocked ▪ Material accumulation in the static mixer ▪ Hardener pump does not work properly 	<ul style="list-style-type: none"> ▪ Open the channel (bore open, clean) ▪ Clean or exchange ▪ Clean the packings or exchange