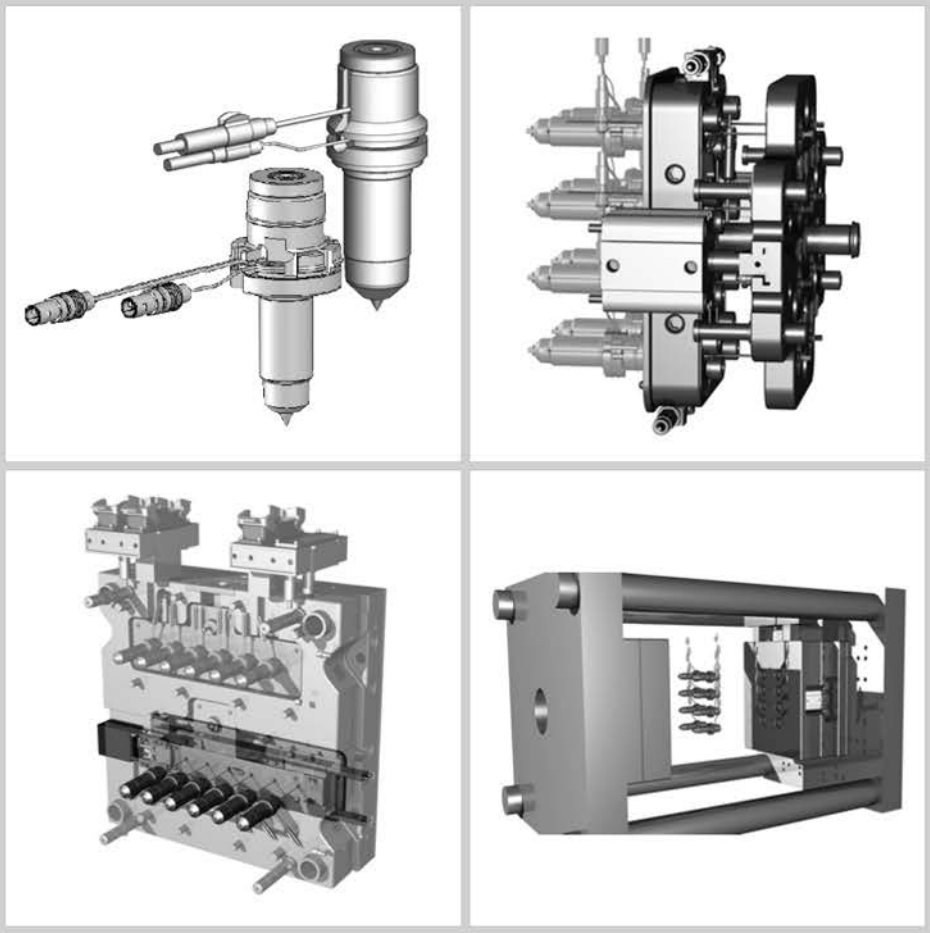
Operating manual

Hot runner technology

- **System**
- **Nozzles**



Read manual before any work begins!

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Translation of the original operating instructions
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Table of contents

1 General information

1.1 Information on this manual

This manual facilitates safe and efficient use of the hot runner system.

The manual is part of the hot runner system and must always be kept in the immediate vicinity of the unit where it is accessible for the personnel. The personnel must have read this manual carefully and understood it prior to starting any work. A basic prerequisite for safe working is compliance with all safety instructions and instructions on use stated in this manual.

The local health and safety regulations and general safety regulations for the area where the hot runner system is used also apply.

Figures in this manual are for basic understanding and may vary from the actual design of the hot runner system.

In addition to this manual, the instructions for the installed components in the appendix also apply.

1.2 Explanation of symbols

Safety instructions

In this manual, safety instructions are labelled with symbols. The safety instructions are introduced by signal words that indicate the extent of the danger.

Always observe the safety instructions and work carefully to avoid accidents, injury and material damage.

DANGER!
... indicates an immediately dangerous situation that will lead to death or serious injury if it is not avoided.

WARNING!
... indicates an possible dangerous situation that could lead to death or serious injury if it is not avoided.

CAUTION!
... indicates an possible dangerous situation that could lead to minor injury if it is not avoided.

NOTICE!
... indicates an possible dangerous situation that could lead to material damage if it is not avoided.

Tips and recommendations

NOTE!

... highlights tips and recommendations as well as information for efficient and problem-free operation.

Special safety instructions

To draw attention to particular dangers, the following symbols are used in the safety instructions:

DANGER!

... indicates a danger from electrical power. Failure to observe the safety instructions creates a risk of serious or fatal injuries.

1.3 Limitation of liability

All information and instructions in this manual have been compiled taking into account the applicable standards and regulations, the state of the art and our many years of experience.

GÜNTHER accepts no liability for damage due to:

- Failure to observe the manual
- Incorrect use
- Use of untrained personnel
- Unauthorised modifications
- Technical changes
- Use of unapproved spare parts

In the event of special versions, if additional options are ordered, or due to the latest technical changes, the actual items supplied may vary from the explanations and illustrations given here.

Our verbal and written application technology support and that obtained from trials is provided to the best of our knowledge, however it is for information only and does not release you from the need to undertake you own testing on the products supplied by us to ascertain their suitability for the intended processes and purposes.

The application and usage of the products is outside our control and is therefore your exclusive responsibility. Should, nevertheless, the possibility of liability arise, liability for all damage is limited to the value of the goods supplied by us and used by you.

We of course guarantee the quality of our products as defined in the our general terms and conditions. You will find these on our website www.guenther-heisskanal.de under "Downloads", "TOC".

The legal provisions applicable at the time of the conclusion of the contract apply.

We reserve the right to make technical changes within the framework of improvements to the performance characteristics and further development.

1.4 Warranty conditions

You will find expanded warranty conditions for hot runner systems and hot valves on our homepage, www.guenther-hotrunner.com under "Download/Catalogue".

1.5 Copyright protection

This manual is protected by copyright and is for internal use only.

Transfer to third parties, reproduction in any form - even partially - as well as use and disclosure of the contents is not permitted without the written approval of the manufacturer, except for internal purposes.

Violations will lead to compensation for damages. We reserve the right to assert further claims.

1.6 Spare parts

WARNING!

Safety risk due to incorrect spare parts!

Incorrect or defective spare parts can impair safety as well as cause damage, malfunctions or complete failure.

For this reason:

– Only use genuine spare parts from the manufacturer.

Spare parts can be found in the main catalogue or on the internet at www.guenther-hotrunner.com.

1.7 Warranty conditions

The warranty conditions are in the general terms and conditions.

1.8 Customer service

Our customer service is available to provide technical information. For contact information, see page 2.

In addition, our employees are always interested in new information and experiences arising from the use of our products and that could be used to improve these products.

2 Safety

This section provides an overview of all important safety aspects for optimal protection of personnel as well as for safe and problem-free operation.

Failure to observe the handling instructions and safety instructions in this manual could lead to dangerous situations.

2.1 Operator responsibilities

The device is operated in the commercial sector. The operator of the device is therefore subject to the legal requirements for work safety.

In addition to the safety instructions in this manual, the accident prevention and environmental protection regulations for the field of operation must also be adhered to.

In particular:

- The operator must inform him/herself of the applicable health and safety regulations and, in a risk assessment, must determine any additional risks that may arise from the particular working conditions at the operation site of the device. These must be included in the operating instructions for the operation of the device.
- Over the entire operating time of the device, the operator must ensure that the operating instructions created by him/her correspond to the current regulations, and, if necessary, adjust them accordingly.
- The operator must clearly specify and regulate the responsibilities for installation, operation, maintenance and cleaning.
- The operator must ensure that all employees that come into contact with the device have read and understood this manual. In addition, he/she must ensure that the personnel undergo regular training and are informed of any potential dangers.
- The operator must provide the personnel with the required protective equipment.

The operator is also responsible for ensuring that the device is in perfect technical condition. The following therefore applies:

- The operator must ensure that the maintenance intervals described in this manual are adhered to.
- The operator must have all safety features regularly checked for functionality and completeness.

2.2 Personnel requirements

2.2.1 Qualifications

WARNING!

Risk of injury as a result of insufficiently qualified personnel!

Improper use could lead to serious injuries or significant material damage.

For this reason:

– Work may only be carried out by personnel qualified for the specific activities in question.

The operating manual lists the qualifications for the various areas of activity.

- **Instructed person**
  was instructed by the operator in a training session on his/her responsibilities and the possible dangers arising from improper behaviour.
- **Qualified personnel**
  are capable of carrying out the work assigned to them and are independently capable of recognising and avoiding any possible dangers as a consequence of their technical education, knowledge and experience as well as knowledge of the relevant regulations.
- **Electricians**
  are capable of carrying out work at the electrical system and are independently capable of recognising and avoiding any possible dangers as a consequence of their technical education, knowledge and experience as well as knowledge of the relevant regulations. The electrician has been trained for the specific area in which he/she works and is familiar with the relevant standards and regulations.

Only persons from whom a reliable standard of work can be expected are permitted as employees. Persons whose reactions are affected by drugs, alcohol or medication, for example, are not permitted.

- Observe the regulations related to age and occupation for the operation site when selecting personnel.

2.2.2 Unauthorised persons

WARNING!

Risk to life for unauthorised persons due to hazards in the danger and working zone!

Unauthorised persons who do not meet the requirements described here will not be familiar with the dangers in the working zone. Therefore, unauthorised persons face the risk of serious injury or death.

- Unauthorised persons must be kept away from the danger and working zone.
- If in doubt, address the persons in question and ask them to leave the danger and working zone.
- Cease work while unauthorised persons are in the danger and working zone.

2.2.3 Training

Personnel must be regularly trained by the operator. For verification purposes, the training must be recorded.

Date	Name	Type of training	Training carried out by	Signature

2.3 Correct use

The unit is designed and built exclusively for the correct use described here.

The hot runner system is used for plasticised plastic melt:

- To transport it from the injection unit to the cavity (direct gating) or the auxiliary gate (indirect gating)
- To ensure it is in a molten state over the entire production process.

Correct use also includes compliance with all the information in this manual.

Any use beyond the correct use or any other form of use is considered incorrect use and can result in dangerous situations.

WARNING!

Danger due to incorrect use!

Incorrect use of the unit can result in dangerous situations.

In particular, do not use the unit as follows:

– Outside the original intended application.
– In a potentially explosive atmosphere.

Claims of any nature due to damage as a result of incorrect use are excluded.

2.4 Personal protective equipment

When working, it is required to wear personal protective equipment to minimise health hazards.

- Always wear the protective equipment required for the task at hand while working.
- In the working area, follow the applicable instructions for personal protective equipment.

Protective equipment

Facial protection
Facial protection protects the eyes and the face from flames, sparks or heat, as well as hot particles or exhaust gas.

Light face mask
to protect against harmful dust.

Protective clothing
is tightly fitting work clothing with low tear resistance and tight sleeves, without protruding parts. It is primarily designed for protection against entanglement in moving machine parts.

Do not wear rings, chains or other jewellery.

Protective gloves
to protect the hands against friction, abrasions, penetration or more serious injury, as well as to protect against contact with hot surfaces.

Safety glasses
to protect the eyes from flying parts and liquid spray.

Safety shoes
for protection against heavy falling parts and slipping on slippery surfaces.

2.5 Particular dangers

The following section outlines the residual risks that were determined in a risk evaluation.

- Observe the safety instructions listed here and the warnings in the next chapter of this manual to reduce health hazards and avoid dangerous situations.

Electrical power

DANGER!

Mortal danger due to electrical power!

There is immediate mortal danger upon physical contact with live parts. Damage to the insulation or individual components could be life-threatening.

For this reason:

- In the event of damage to the insulation, immediately switch off the power supply and have the damage repaired.
- Only have work on the electrical system undertaken by electricians.
- For all work on the electrical system, switch off the power supply and check that it is free from voltage.
- Switch off the power supply and secure it against restarting before maintenance, cleaning and repair work.
- Do not bridge fuses or disable them. When replacing fuses, observe the correct amperage.
- Keep current-carrying parts dry. A short-circuit could otherwise result.

Hydraulics

WARNING!

Mortal danger due to hydraulic energy!

Hydraulic energy can cause serious or fatal injuries.

Hydraulically driven parts can move unexpectedly.

If individual parts are damaged, hydraulic fluid may escape under high pressure.

For this reason:

- Only have work undertaken on the hydraulics by trained skilled personnel.
- Prior to starting work on the hydraulic system, first shut it down and de-pressurise it. Fully de-pressurise the accumulator. Check that it is de-pressurised.
- Do not change pressure settings beyond the maximum values.

Hot operating materials

WARNING!

Risk of burns due to operating materials!

During operating, operating materials may become very hot and cause burns on contact.

For this reason:

– Before handling operating materials, check whether they are hot. If necessary, let them cool down.

Sharp edges and pointed corners

WARNING!

Risk of injury from edges and corners!

Sharp edges and pointed corners could cause abrasions or wounds on the skin.

For this reason:

– Proceed carefully when working in the vicinity of sharp edges and pointed corners.
– If in doubt, wear protective gloves.

Hot surfaces

WARNING!

Risk of burns due to hot surfaces!

Contact with hot components can cause burns.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.
– Prior to all work, ensure all components have cooled to ambient temperature.

2.6 Safety features

WARNING!

Mortal danger due to non-functional safety features!

Safety is only ensured if the safety features are intact.

For this reason:

- Prior to starting work, check whether all safety features are functional and correctly installed.
- Never disable or bypass safety features.
- Ensure that all safety features are always accessible.

Integration into an emergency stop concept is required

The device is intended for use within a system. It does not have its own control system or autonomous emergency stop function.

Before the device is put into operation, install emergency stop equipment and integrate it into the safety chain of the plant control.

Connect the emergency stop equipment so that dangerous situations for persons and material assets are avoided in the event of an interruption to the power supply or activation of the power supply after an interruption.

The emergency stop equipment must always be freely accessible.

2.7 Securing against restarting

WARNING!

Mortal danger due to unauthorised restarting!

For work in the hazard area, there is a risk that the power supply could be restarted without authorisation. This results in mortal danger for any persons in the hazard area. For this reason:

- Observe the instructions on securing against restarting in the chapters of this manual.
- Always observe the procedure described below for securing against restarting.

Securing against restarting

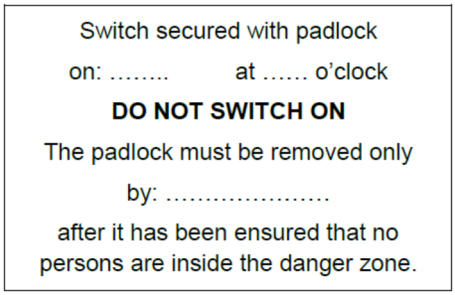


Fig. 1

1. Switch off the power supply.
2. If possible, secure the switch with a lock and affix a clearly visible sign as per Fig. 1 on the switch.
3. The employee named on the sign holds the key.

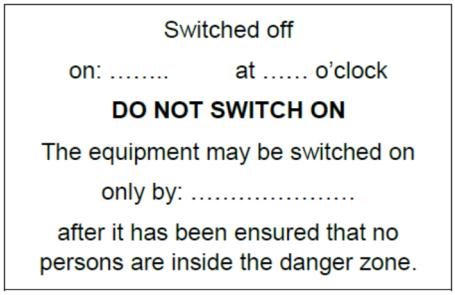


Fig. 2: Securing against restarting2

4. If it is not possible to secure the switch with a lock, put up a sign as per Fig. 2.
5. When all work has been carried out, ensure that nobody is in the hazard area.
6. Ensure that all protective equipment is installed and functional.
7. Only then remove the sign.

2.8 Behaviour in the event of danger and accidents

Preventative measures

- Always be prepared for accidents or fire!
- Always keep first-aid equipment (first-aid kid, blankets, etc) at hand.
- Familiarise personnel with accident reporting, first aid and rescue equipment.
- Keep access routes free for emergency vehicles.

Measures in the event of an accident

- Trigger an emergency stop immediately.
- Administer first aid.
- Retrieve persons from the hazard area.
- Inform the responsible persons at the operating site.
- Alert the emergency services.
- Ensure that access routes for emergency vehicles are free.

2.9 Environmental protection

ENVIRONMENT!

Incorrect handling causes environmental hazards!

Incorrect handling of environmentally hazardous substances, in particular incorrect disposal, could cause significant environmental damage.

For this reason:

– Always observe the information listed below.
– If environmentally damaging materials are accidentally released into the environment, immediately take suitable measures. If in doubt, inform the relevant local authority of the damage.

The following environmentally damaging materials are used:

Lubricants

Lubricants such as greases and oils contain toxic substances. They must not be allowed to escape into the environment. Disposal must be carried out by a specialised disposal company.

Material processed

Pay attention to the safety data sheet from the manufacturer of the material.

3 Technical data

3.1 Connected loads

Electrical

Data	Value	Unit
Voltage	230	V~

System*

Data	Value	Unit
Max. permissible operating pressure in the hot runner system	2,000	bar
Max. ambient temperature	450	°C

* If special nozzles or other components with a pressure limit (less than 2,000 bar) are fitted to systems or individual tools, this situation is documented in the height adjustment and on the type plate.

Hydraulic

Data	Value	Unit
Single needle valve	40	bar
Lifting plate mechanism	40 - 60	bar
Sliding cam mechanism	40 - 60	bar
Max. ambient temperature	100	°C

Pneumatic**

Data	Value	Unit
Single needle valve	min. 6	bar
Lifting plate mechanism	8 - 10	bar
Sliding cam mechanism	8 - 10	bar
Max. ambient temperature	100	°C

** For specific countries a pressure of 6 bar may also be adequate. If higher pressures are required, a pressure booster is required. In this case, contact customer service (see page 2).

NOTE!

Pay attention to the balancing of the oil feed and oil outlet ducts as well as of the air feed and air outlet ducts.

Thermocouple

Parameter
FeCuNi in line with DIN IEC 584, DIN 43714

3.2 Operating conditions

Environment

Parameter
Industrial indoor environment

Duration

Parameter
Continuous operation

3.3 Lubricants

Application area	Lubricants	Manufacturer
Single needle valve - ENV - (surface over which the O-rings slide)	Turmogrease N2-STR	Lubricant Consult
Sliding cam mechanism - ANES- (sliding surface)	Barrierta L55/2 High-temperature long-life grease	Klüber Lubrication

3.3.1 Type plate

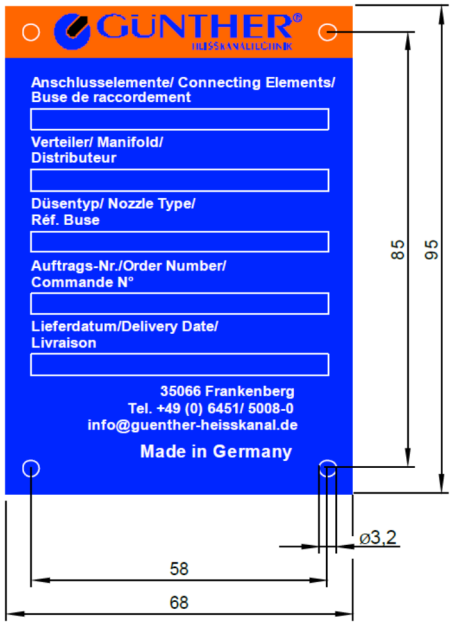


Fig. 3: Type plate (example)

The type plate contains the following information:

- Manufacturer
- Connection elements
- Manifold
- Nozzle type
- Order number
- Delivery date
- Manufacturer's address

Other type plates:

- Nozzle
- Hot half, layout
- 2 components

NOTE!

If special nozzles or other components with a pressure limit (less than 2000 bar) are fitted to systems or individual tools, this situation is documented in the height adjustment and on the type plate.

Further technical data is available in the catalogue and on the internet at www.guenther-heisskanal.de.

4 Design and function

4.1 Overview of hot runner system

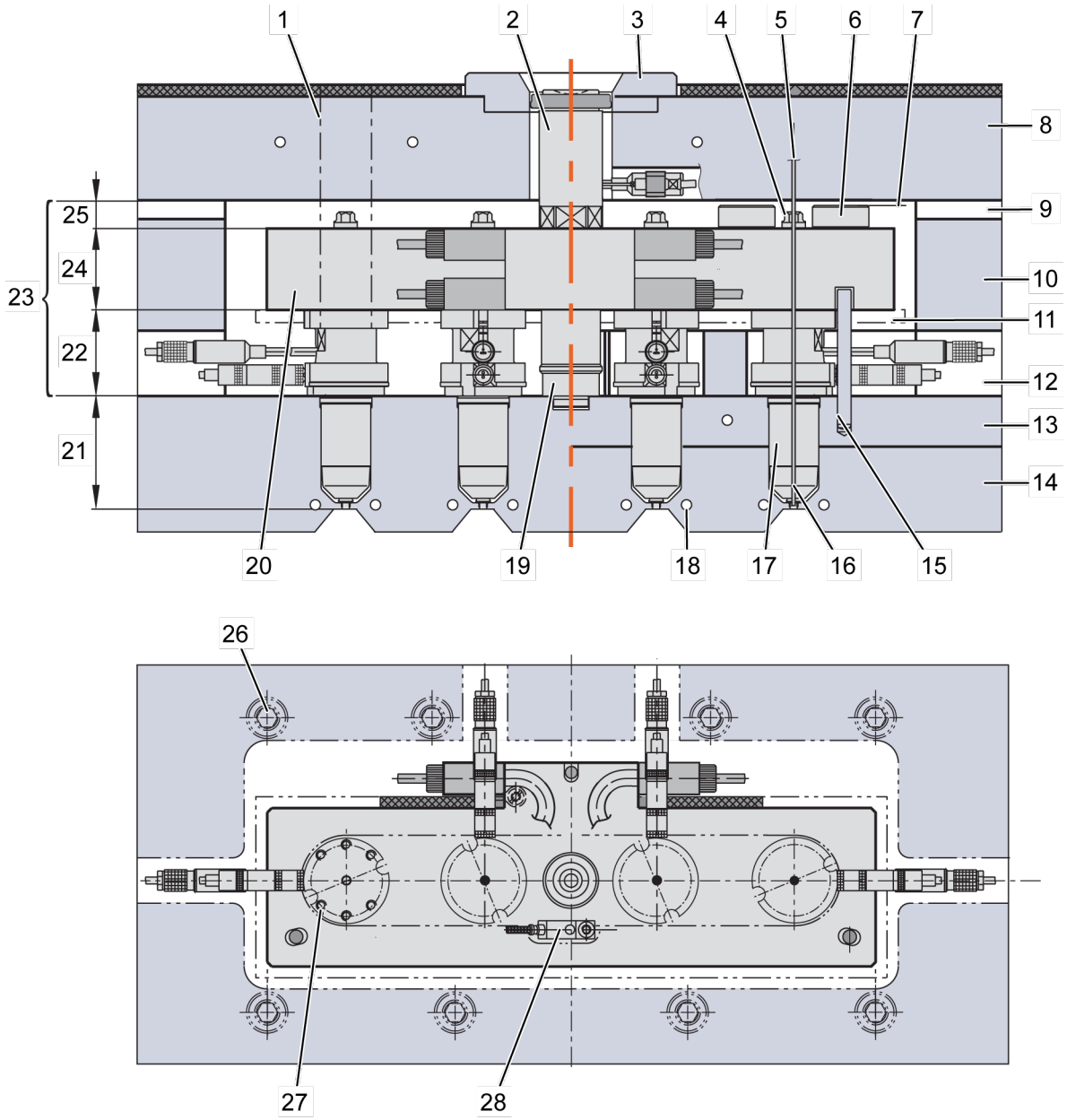


Fig. 4: Hot runner system

1 Holes on the clamping plate
2 Connection elements
3 Locating ring
4 Sealing assembly (only for nozzles with needle valve)
5 Needle actuation
6 Pressure pad
7 Heat expansion gap K
8 Clamping plate/lifting plate
15 Cylindrical pin to prevent twisting
16 Valve needle
17 Hot runner nozzle
18 Temperature control
19 Support piece
20 Manifold
21 Assembly depth in the cavity plate
22 Height of the nozzle head
23 Installation height of the hot runner
24 Manifold height

9 Air circulation above and below depending on the position of the mould
10 Frame plate
11 High temperature insulating plate
12 Cable channel
13 Supporting plate
14 Cavity plate
25 Height of the pressure pad + heat expansion gap K
26 Close-to-manifold screw connection
27 Position/screw connection dependent on the nozzle type and run of the manifold heater
28 Surface mounted thermocouple

The hot runner system is used to move the plasticised melt from the injection unit to the cavity (direct gating) or the auxiliary gate (indirect gating) and to ensure it is in a molten state over the entire production process.

4.2 Connections for power receptacle and thermocouple

4.2.1 Power receptacle -CMT-/thermoplug -CMLK-

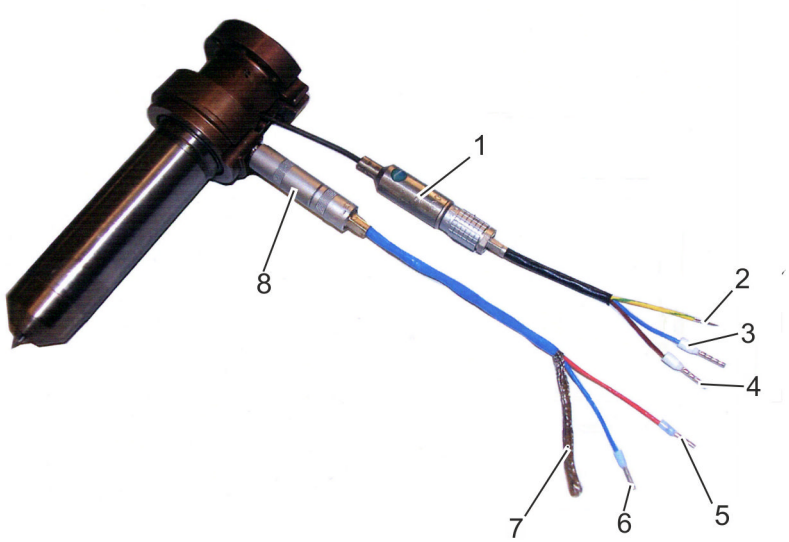


Fig. 5: Connections power receptacle -CMT-/thermoplug -CMLK-

1 Power receptacle -CMT-
2 Ground wire -PE-
3 Neutral wire -N-
4 Phase wire -L-
5 Positive -red-
6 Negative -blue-
7 Screen yellow/green
8 Thermoplug -CMLK-

Nozzle type:

- 8-10SET/DET
- 5-12NEST
- 4-10SHT/DHT/NHT
- 4-16SLT/DLT
- 4-12NLT
- 8-12SMT/DMT/NMT

Connection nozzle type (only for power receptacle CMT):

- AKD
- ASD

4.2.2 Power receptacle -FKT-/thermoplug -CMLK-

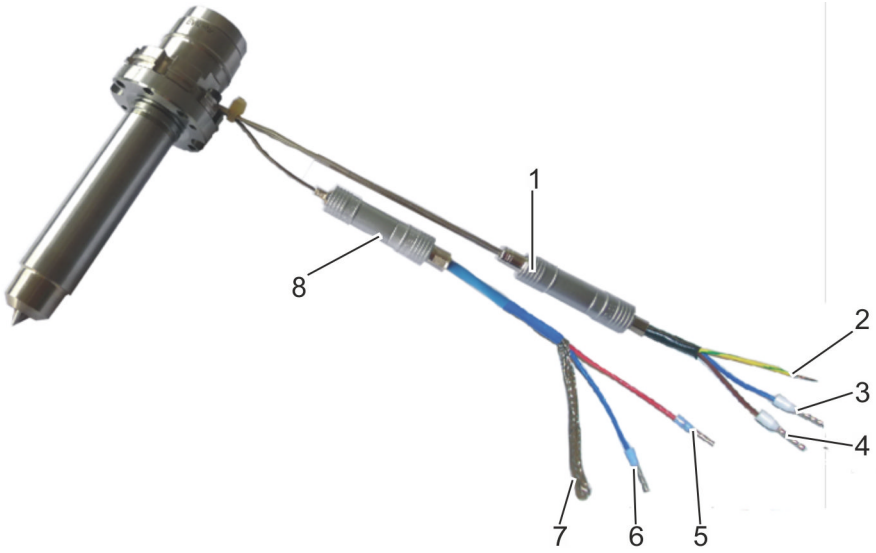


Fig. 6: Overview of hot runner nozzle FKT

1	Power receptacle -FKT-	5	Positive -red-
2	Ground wire -PE-	6	Negative -blue-
3	Neutral wire -N-	7	Screen yellow/green
4	Phase wire -L-	8	Thermoplug -CMLK-

Nozzle type:

- 4-6STT/DTT/NTT

5 Transport, packaging and storage

5.1 Safety instructions when transporting

Incorrect transportation

NOTICE!

Damage due to incorrect transportation!

Incorrect transportation could cause significant material damage.

For this reason:

– When unloading the packages on delivery, as well as during internal transportation, proceed carefully and observe the symbols and information on the packaging.
– Only use the attachment points provided.
– Only remove packaging shortly before installation.

Suspended loads

WARNING!

Mortal danger due to suspended loads!

When raising loads, there is a risk of fatal injury from falling parts or parts swinging uncontrollably.

For this reason:

– Never remain under suspended loads.
– Observe the information on the attachment points provided.
– Never attach to protruding machine parts or to eyelets of installed components. Ensure that the lifting tackle is seated correctly.
– Only use approved hoists and lifting tackle with a sufficient load-carrying capacity.
– Do not use torn or frayed ropes or belts.
– Do not place ropes and belts over sharp edges or corners; do not kink or twist them.

Eccentric centre of gravity

WARNING!

Risk of falling from an eccentric centre of gravity!

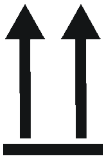
Packages may have an eccentric centre of gravity. An incorrect attachment could lead to the package tipping, which could cause life-threatening injuries.

For this reason:

– Observe the markings on the packages.
– Attach the crane hook so that it is above the centre of gravity.
– Lift carefully and observe whether the load tips. If necessary, change the attachment.

5.2 Symbols on the packaging

This way up



The arrows indicate the upper side of the package. They must always point upwards, as the contents may otherwise be damaged.

Keep dry

Keep the packages dry and away from moisture.

Fragile

Indicates packages with fragile or sensitive contents.

Handle the package with care, do not let it fall or subject it to impacts.

5.3 Transport inspection

Upon receipt of the delivery, inspect it immediately for completeness and transport damage.

Proceed as follows if externally visible transport damage is detected:

- Do not accept the delivery, or accept it with reservations.
- Note the extent of the damage on the transport documentation or on the transporter's delivery note.
- Initiate a claim.

Initiate a claim for every defect as soon as it is detected. Claims for damages can only be invoked within the applicable claim period.

5.4 Transport

Attachment points

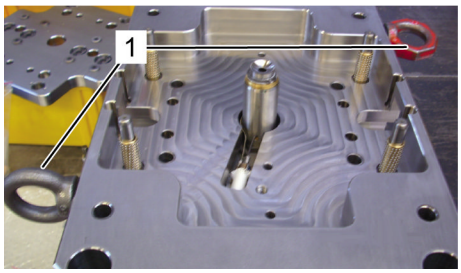


Fig. 7: Example of ring screws as attachment points

The various components have threaded holes for fastening ring screws (1) as attachment points.

Use suitable ring screws in accordance with DIN EN 580.

Transportation of packages with the crane

Packages with lifting eyelets can be directly transported with a crane under the following conditions:

- The crane and hoists must be designed for the weight of the package.
- The operator must be authorised to operate the crane.

Attaching:

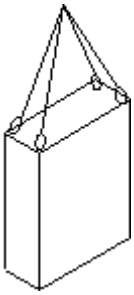


Fig. 8

1. Attach ropes, belts or multiple-point suspension gear as per Fig. 8.
2. Ensure that the package hangs straight, if necessary observe for an eccentric centre of gravity.
3. Begin transportation.

Transportation of pallets with the crane

Packages that are secured to a pallet can be transported with a crane under the following conditions:

- The crane and hoists must be designed for the weight of the package.
- The operator must be authorised to operate the crane.

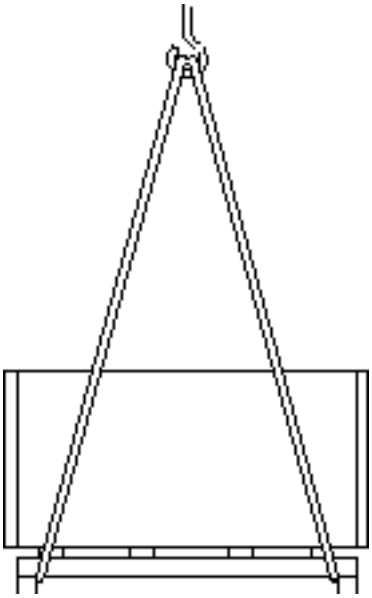


Fig. 9

Attaching:

1. Attach ropes, belts or multiple-point suspension gear to the pallet as per Fig. 9.
2. Check whether the packages have been damaged by the lifting tackle. If necessary, use different lifting tackle.
3. Begin transportation.

Transportation of pallets with the forklift

Packages that are secured to a pallet can be transported with a forklift under the following conditions:

- The forklift must be designed to carry the weight of the transport unit.
- The driver must be authorised to drive the forklift.

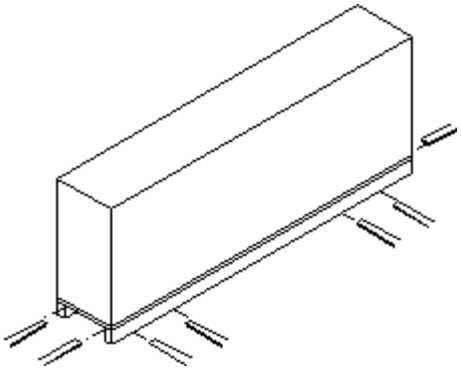


Fig. 10

Attaching:

1. Drive the forks of the forklift between or under the holms of the pallet.
2. Drive them in so that they emerge through the other side.
3. Ensure that the pallet cannot tip if the centre of gravity is eccentric.
4. Lift the package and begin transportation.

5.5 Packaging

On packaging

The individual packages are packed according to the expected transportation conditions. Environmentally friendly materials are exclusively used for packaging.

The packaging is intended to protect the individual components from transport damage, corrosion and other damage up to the point of installation. Therefore, do not destroy the packaging and only remove it shortly before installation.

Handling packaging materials

Dispose of packaging material in accordance with the applicable legal requirements and local regulations.

ENVIRONMENT!

Danger for the environment from incorrect disposal!

Packaging materials are valuable raw materials and can be reused in many different circumstances, or can be repurposed for further use. Incorrect disposal of the packaging materials could result in danger for the environment.

– Dispose of packaging materials in an environmentally friendly manner.
– Observe the applicable local regulations for disposal. If necessary, contract a specialist company for disposal.

5.6 Storage

Storing the packages

Store the packages under the following conditions:

- Do not store in the open.
- Store in dry and dust-free conditions.
- Do not expose to any aggressive media.
- Protect from direct sunlight.
- Avoid mechanical vibrations.
- Storage temperature: 15 to 35 °C.
- Relative humidity: max 60 %.
- For storage over 3 months, regularly check the condition of all parts and the packaging. If necessary, refresh or renew the conservation.

It is possible that the packaging may contain instructions on storage that goes beyond the requirements listed here. These are also to be observed.

6 Installation and initial commissioning

6.1 Safety

Personnel

- **Installation and initial commissioning are only allowed to be undertaken by specially trained skilled personnel.**
- **Work on the electrical system is only allowed to be undertaken by electricians.**

Personal protective equipment

The following protective equipment is to be worn during all installation and initial commissioning work:

- Protective clothing
- Safety shoes

NOTE!

Specific reference is made in the warnings in this section to additional protective equipment that is necessary for specific tasks.

Electrical system

DANGER!

Mortal danger due to electrical power!

There is a risk of fatal injury upon contact with current-carrying components. Electrical components that are switched on could move in an uncontrolled fashion and cause severe injuries.

For this reason:

– Before beginning work, switch off the power supply and secure it against restarting.

Securing against restarting

WARNING!

Mortal danger due to unauthorised restarting!

During installation, there is a risk that the power supply could be restarted without authorisation. This results in mortal danger for any persons in the hazard area.

For this reason:

– Before beginning work, switch off all power supplies and secure against restarting.

Incorrect installation and initial commissioning

WARNING!

Risk of injury from incorrect installation and initial commissioning!

Incorrect installation and initial commissioning could cause severe injuries or material damage.

For this reason:

- Before beginning work, ensure that there is enough space for the installation.
- Handle open, sharp-edged components carefully.
- Ensure that the installation location is clean and tidy. Loose components or tools stacked on top of each other or lying around could cause accidents.
- Install the components correctly. Observe the specified screw tightening torques.
- Secure the components so that they do not fall or topple over.

6.2 Preparation

6.2.1 Checking requirements

The requirements for installation must be checked based on the following checklist. Only continue with installation once all points have been met.

Requirement	Met	Not met
Adequate screw fastening available? Screw property class 12.9		
10 mm air to manifold available?		
Receptacle for dowel pins available?		
Receptacle for support piece available?		
Adequate cooling available in the gate area?		
Separate cooling circuits available?		
Adequately large cable channels available?		
External housing installed on the mould with adequately long spacer sleeves due to convection of heat?		

6.2.2 Tools required

For speedy installation, it is advisable to have all the necessary tools available prior to starting work.

Tools
Hex wrenches
Socket wrench with sockets
Torque wrench
Cross-bladed/flat-bladed screwdriver
Wire strippers
Crimping tool
Side cutters
Depth gauge
Micrometer
Electronic test instrument for checking insulation and ground wire resistance
Socket set for needle adjustment
Power and thermocouple cables
Hydraulic/pneumatic connection
Controller for mould temperature control

6.2.3 Measuring height adjustment

- Only to be undertaken by appropriately qualified personnel.

Protective equipment:
- Protective clothing
- Safety shoes
- Protective gloves

1. With aid of the sheet, measure the height adjustment.
2. Document the dimensions in the table below.

Dimensions	Measurement [mm]
Distance: Nozzle and pressure pad contact	
Check contact face on the support piece	
Tolerance on the nozzle contact faces 0.03 mm	
Dimension "L"	
Calculate dimension "K" using the table	
Dimension of the titanium pressure pieces	
Finish titanium pressure pads: Check fore chamber geometry, injection gate diameters all the same?	

6.2.4 Heat expansion gap "K"

The height difference between the manifold and the frame plate must be determined by the individual parts.

The dimension "K" necessary for the heat expansion (see sheet "Height adjustment/dimension check" in the appendix) must be provided by grinding the pressure pads (12 mm).

In the table below, ΔT gives the temperature difference between the processing temperature and the mould temperature.

The “Delta Tool" program (Fig. 11) for calculating the heat expansion gap "K" is available as a free download on the internet at www.guenther-hotrunner.com.

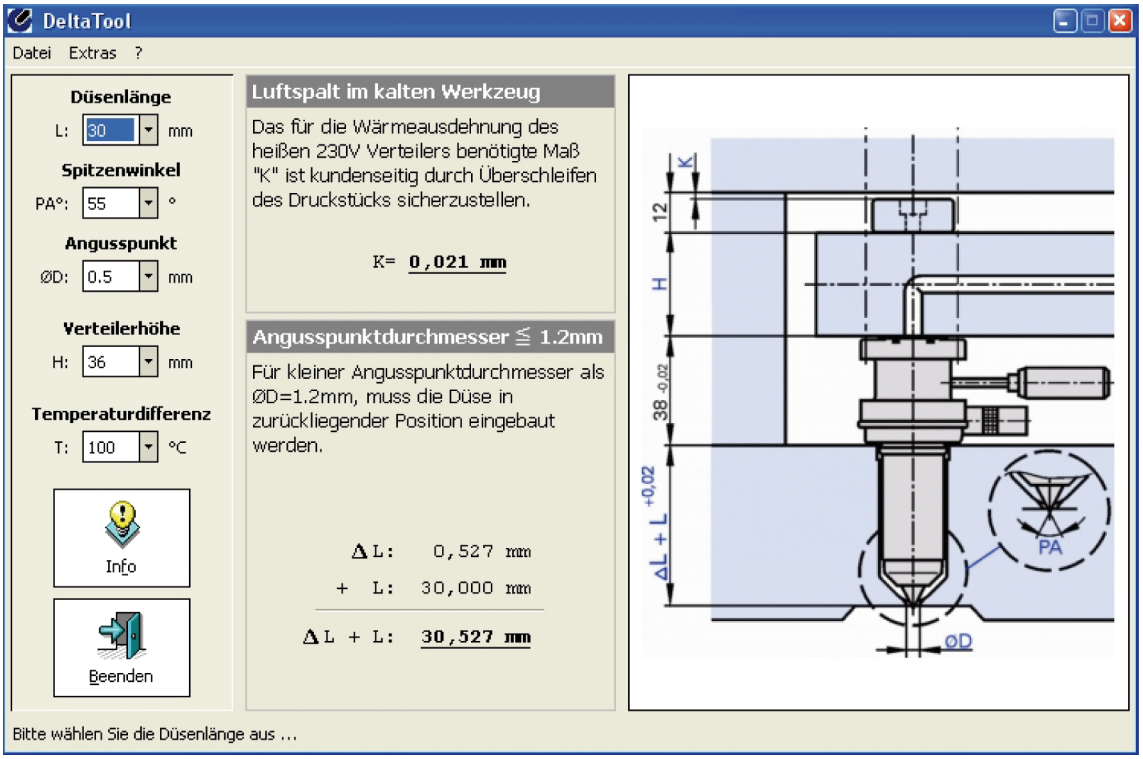


Fig. 11: Delta Tool Program

Table heat expansion gap "K"

Manifold height	ΔT [°F]	100	150	200	250	300	350
36 mm	K (mm)	0.021	0.059	0.098	0.137	0.177	0.217
46 mm	K (mm)	0.033	0.078	0.124	0.170	0.218	0.264
56 mm	K (mm)	0.046	0.097	0.150	0.203	0.258	0.311

6.3 Installation

6.3.1 "Hot half" assembly

- Only to be undertaken by appropriately qualified personnel.
- Work on the electrical system is only allowed to be undertaken by an electrician.

NOTE!

If the height is adjusted correctly, the system is sealed via the pretension between the material tube (nozzle) and the surface of the manifold.

Steps 1 to 16 are the same as the actions for assembling valve gate systems with a lifting plate or sliding cam mechanism.

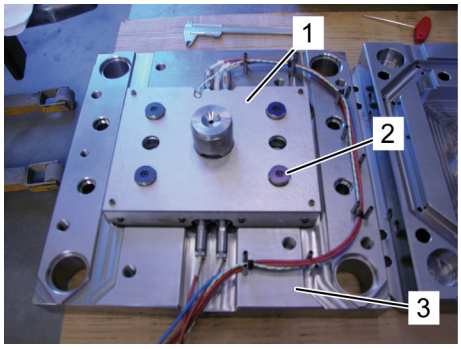


Fig. 12: Fitting the manifold and pressure pads

1. Fit the manifold (1) to the frame plate (3).
2. Fit the pressure pads (2) to the manifold (1).

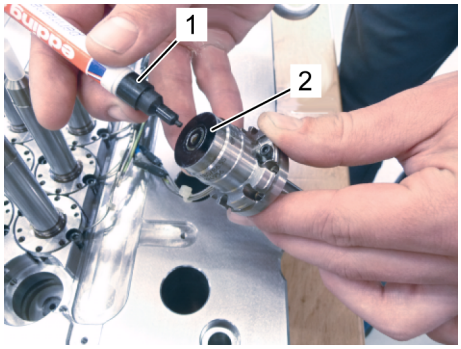


Fig. 13: Marking the sealing face on the nozzles

3. Mark the pressure pads and sealing faces (2) on the nozzles using a permanent marker (1) (e.g. Edding felt-tip pen).

> *NOTE!*
>
> *Using a permanent marker (e.g. Edding felt tip pen) the layer of ink is thinner than, e.g., engineering blue and therefore the imprint is clearer.*

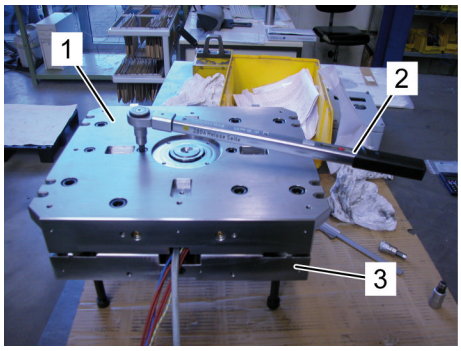


Fig. 14: Fitting the clamping plate

4. Fit the clamping plate (1) to the frame plate (3). If necessary, fit the struts and check the exact height.
5. Using a torque wrench (2), tighten the screws to the stipulated tightening torque (↯ *Chapter 9.4 „Tightening torques“ on page 79*).

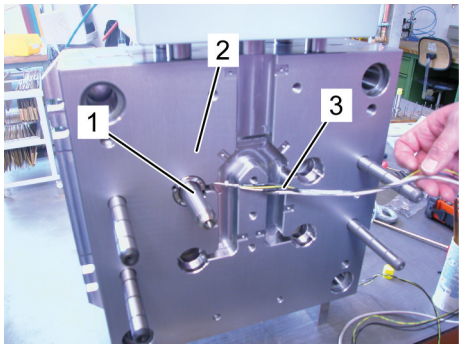


Fig. 15: Fitting the nozzles

6. Fit the nozzles (1) to the supporting plate/frame plate (2) and tighten, taking into account the stipulated tightening torque (*Chapter 9.4 „Tightening torques“ on page 79*).
7. Label the wires as per the wiring diagram and lay in the cable channel.

NOTICE!
Material damage due to incorrect wiring!
If the wires are laid incorrectly, they may be damaged, e.g., by heat.
For this reason:
– Ensure the wires do not touch the manifold.

DANGER!
Mortal danger due to electrical power!
There is immediate mortal danger upon physical contact with live parts.
For this reason:
– Only have work on the electrical system undertaken by electricians.

NOTE!
Depending on the cavity plate, screws longer than the guide pillars may need to be screwed into the frame plate for support. As an alternative, the mould can also be supported with strips.

8. Place the assembled clamping and frame plate, including the nozzle, on the struts in a horizontal direction.

CAUTION!
Risk of burns due to hot surfaces!
Contact with hot components can cause burns.
For this reason:
– During all work near hot components, always wear protective clothing and gloves.
– Prior to all work, ensure all components have cooled to ambient temperature.

9. Warm the manifold to the processing temperature (see the operating manual for the control system).
10. Switch off the control system (see the operating manual for the control system) and leave the hot runner system to cool down to room temperature.
11. Remove the clamping plate and nozzles.

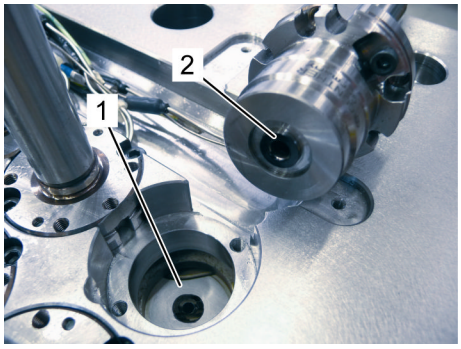


Fig. 16: Check the nozzle for leaks

12. Check the imprints between the nozzles (2) and manifold (1) and the clamping plate and pressure pads.

CAUTION!
Damage due to leaks!
Improper or incorrect height adjustment can result in leaks.

For this reason:

– If the imprints are inadequate, check the height adjustment again.

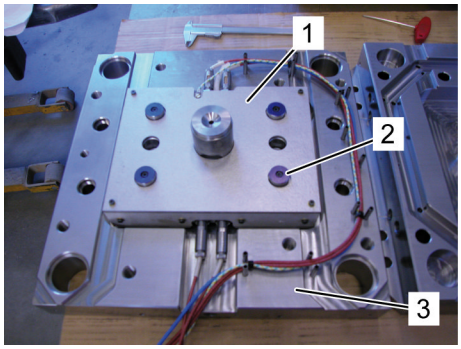


Fig. 17: Fitting the manifold and pressure pads

13. Fit the revised pressure pads (2) to the manifold (1).

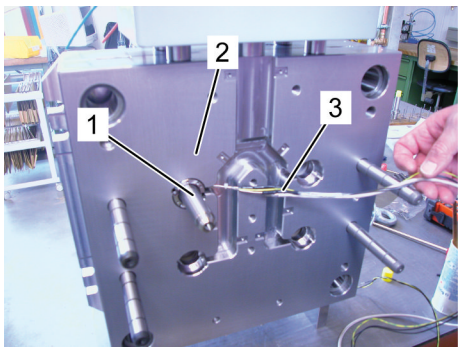


Fig. 18: Fitting the nozzles

14. Fit the nozzles (1) to the frame plate (2) and tighten using a torque wrench, taking into account the stipulated tightening torque (for tightening torques see section "Tightening torques").

15. Lay wire 3 in the cable channel.

NOTE!

Depending on the cavity plate, screws longer than the guide pillars may need to be screwed into the frame plate for support. As an alternative, the mould can also be supported with strips.

- For further assembly steps on valve gate systems with lifting plate mechanism, see section "Assembly of valve gate systems with lifting plate mechanism"
- For further assembly steps on valve gate systems with sliding cam mechanism, see section "Assembly of valve gate systems with sliding cam mechanism"

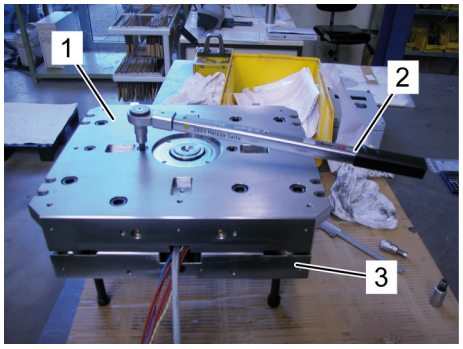


Fig. 19: Fitting the clamping plate

16. Fit the clamping plate (1) to the frame plate (3). If necessary, fit the struts and check the exact height.

17. Using a torque wrench (2), tighten the screws to the stipulated tightening torque (for tightening torque see section "Tightening torques").

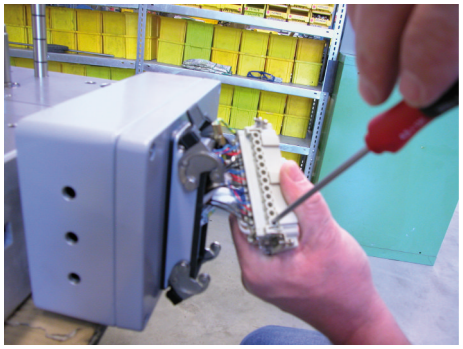


Fig. 20: Wiring the mould

18. Wire the mould as per the connection scheme and circuit diagram (see appendix).

DANGER!

Mortal danger due to electrical power!

There is immediate mortal danger upon physical contact with live parts.

For this reason:

– Only have work on the electrical system undertaken by electricians.

19. Check wiring and record resistance values in the table below.

Check wiring	Resistance	Insulation resistance	Ground wire resistance
Heaters: Resistance and insulation resistance (max. 1,000 V)			
Temperature sensor resistance			

20. Check the arrangement of the heater in relation to the thermocouple using a controller (see operating manual for the controller).

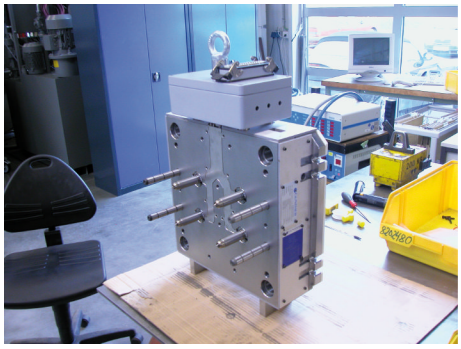


Fig. 21: "Hot half" completed

21. Connect the ground wire to the earth terminal.

⇨ The "hot half" has been completed and checked for correct function.

6.3.2 Installation of valve gate systems with lifting plate mechanism

- Only to be undertaken by appropriately qualified personnel.
- Requirement: Height adjustment completed taking into account the heat expansion gap "K".

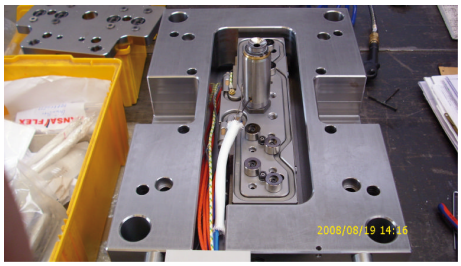


Fig. 22: Height adjustment completed

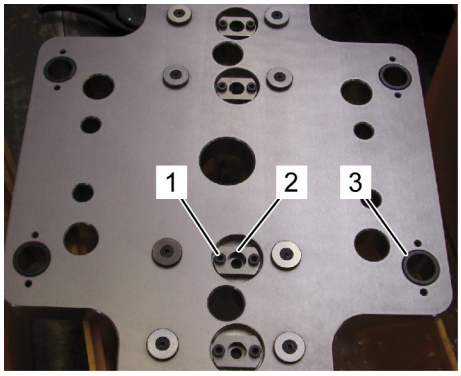


Fig. 23: Lifting plate mechanism

1. Fit the guide sleeves (3) and needle receptacles (2) into the lifting plate mechanism.

2. Using a torque wrench, tighten the screws (1) to the stipulated tightening torque (for tightening torques see section "Tightening torques").

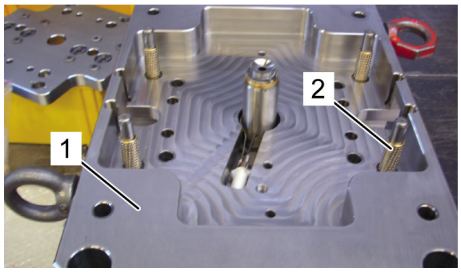


Fig. 24: Lifting plate

3. Fit the lifting plate (1) to the manifold frame plate and using a torque wrench, tighten the screws to the stipulated tightening torque (for tightening torques see section "Tightening torques").

4. Fit the guide pins (2) and the ball guide.

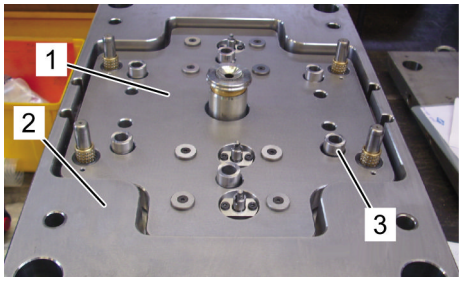


Fig. 25: Fitting the lifting plate mechanism

5. Fit the lifting plate mechanism (1) to the lifting plate (2).
6. Fit the support (3) between the lifting plate and the clamping plate.
7. Fit the clamping plate and using a torque wrench, tighten the screws to the stipulated tightening torque (for tightening torques see section "Tightening torques").
8. Wire the mould as per the connection scheme and circuit diagram (see appendix).

DANGER!

Mortal danger due to electrical power!

There is immediate mortal danger upon physical contact with live parts.

For this reason:

– Only have work on the electrical system undertaken by electricians.

9. Check wiring and record resistance values in the table below.

Check wiring	Resistance	Insulation resistance
Heaters: Resistance and insulation resistance (max. 500 V)		
Temperature sensor resistance		

10. Check the arrangement of the heater in relation to the thermocouple using a controller (see operating manual for the controller).
11. Connect the ground wire to the earth terminal.
12. Fit the needle (see section "Installation of the needle").

6.3.3 Installation of valve gate systems with sliding cam mechanism

- Only to be undertaken by appropriately qualified personnel.
- Requirement: Height adjustment completed taking into account the heat expansion gap "K".

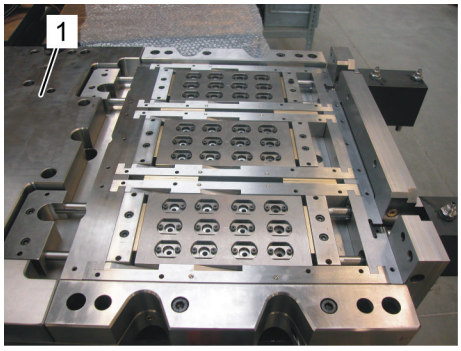


Fig. 26: Fitting the clamping plate

1. Fit the clamping plate (1) to the manifold frame plate and using a torque wrench, tighten the screws to the stipulated tightening torque (for tightening torques see section "Tightening torques").

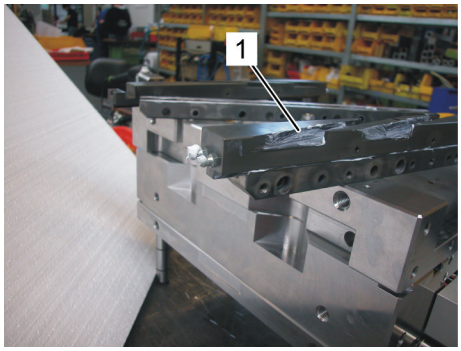


Fig. 27: Control rails

2. Check the control rails (1) and keys for correct function.
3. Lubricate the control rails and keys using a high temperature long-life grease.

NOTE!

Due to the high temperature long-life grease, the sliding cam mechanism functions correctly over a long period even with high temperatures in the area of the frame plate and clamping plate (up to 100 °C). Pay attention to the data sheets from the manufacturer of the high temperature long-life grease.

4. Assemble the components.
5. Perform a function test in the clamping plate.

NOTE!

If necessary, the control rails must be reworked by grinding.

6. Lubricate the lubrication ducts at the grease nipples.
7. Fit the drive cylinder (1).

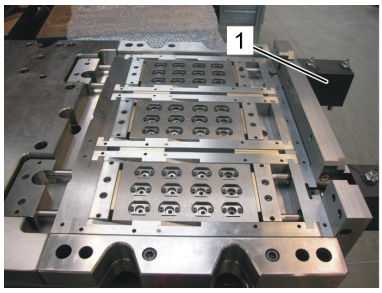


Fig. 28: Fitting the drive cylinder

CAUTION!

Risk of injury due to moving parts!

Risk of injury due to moving components! Moving components can cause serious injuries.

For this reason:

– Do not reach into moving parts.

8. Check the function of the sliding cam mechanism in conjunction with the drive medium.

9. Wire the mould as per the connection scheme and circuit diagram (see appendix).

DANGER!

Mortal danger due to electrical power!

There is immediate mortal danger upon physical contact with live parts.

For this reason:

– Only have work on the electrical system undertaken by electricians.

10. Check wiring and record resistance values in the table below.

Check wiring	Resistance	Insulation resistance
Heaters: Resistance and insulation resistance (max. 500 V)		
Temperature sensor resistance		

11. Check the arrangement of the heater in relation to the thermocouple using a controller (see operating manual for the controller).
12. Connect the ground wire to the earth terminal.
13. Fit the needle (see section "Installation of the needle").

6.3.4 Installation of the needle

- Only to be undertaken by appropriately qualified personnel.

CAUTION!

Risk of burns due to hot surfaces!

Contact with hot components can cause burns.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.

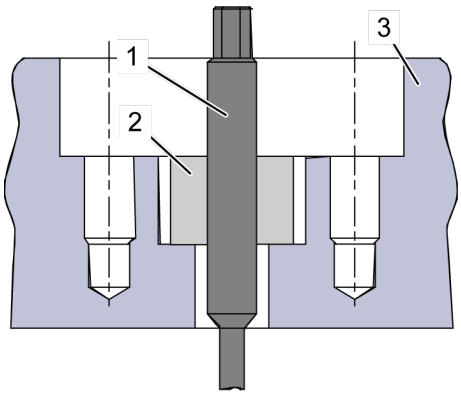


Fig. 29: Fitting the needle

1. Warm the hot runner system to the processing temperature (see the operating manual for the machine's control system).
2. Screw the needle (1) into the needle receptacle (2) and fit it into the lifting plate mechanism (3).

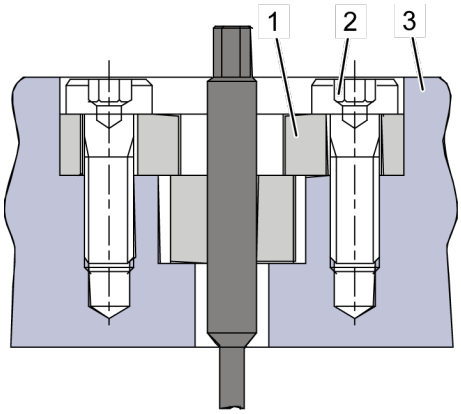


Fig. 30: Fitting the cover

3. Fit the cover (1) into the lifting plate mechanism (3) and using a torque wrench, tighten the screws (2) to the stipulated tightening torque (for tightening torques see section "Tightening torques").

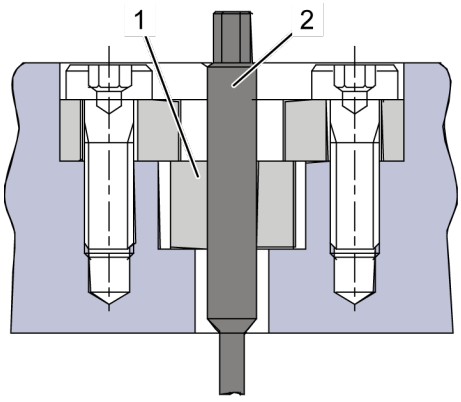


Fig. 31: Screwing on the adjusting nut

4. Screw the adjusting nut (1) onto the needle (2).
5. Adjust the needle (see section "Adjustment of the needle").

6.4 Notes on the valve-gate

- Only to be undertaken by appropriately qualified personnel.

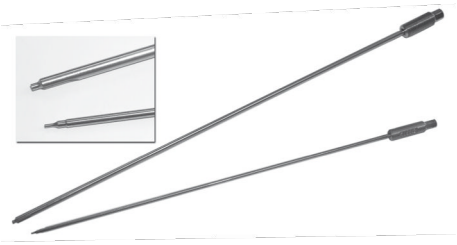


Fig. 32: Valve needles with adjusting thread

Pay attention to the following information on the adjustment of the needles:

- The needles are only pre-adjusted on the delivery of the "hot valves". They must be re-adjusted after the installation of the cavity plate once the operating temperature has been reached.
- The needles have a basic hardness of 64HRC (HSS steel). On valve gate systems without LA needle guides made of PM steel, pay attention to the selection of the material for the inserts. If necessary, consult GÜNTHER (for contact address see page 2).
- After shutting down the hot runner, the mould cooling must continue to run for approx. 30 minutes to prevent damage to the hot runner, e.g. to the sealing rings due to the build up of heat.

Requirements

NOTICE!

Damage due to improper preparation!

If the following information is not observed, the needle guide or the needle may be damaged.

For this reason:

– It is imperative that the following information is observed.

- The hot runner system and the mould are completely installed and wired.
- The needle drive is in the "Needle closed" position.
- The needles are pre-adjusted so that they do not collide with the needle guide during the "needle closing" command.
- The needles are around 1 mm behind the edge of the item.

Adjusting the needle

1. Connect the mould to the control system (see the operating manual for the control system) and to the temperature control.

CAUTION!

Risk of burns due to hot surfaces!

Contact with hot components can cause burns.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.

2. Bring the mould to operating temperature.
3. Warm the hot runner system to the processing temperature (see the operating manual for the control system).
4. Fix the needle drive in the "needle closed" position (e.g. using compressed air on the "Close needle" connection).

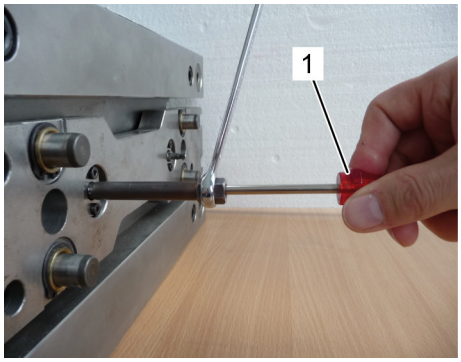


Fig. 33: Adjusting the needle

5. Using the set of wrenches supplied (1), place the needle in the front position (at the cavity) by turning it to the right. By turning it to the left, the needle is placed in the rear position (out of the cavity).
6. Measure the needle position using a depth gauge or a dial gauge and re-adjust it, if necessary.
7. Tighten the lock nut, operate the needle drive 2 to 3 times, then check the needle position again.

Needle diameter	Thread	Tightening torque
2 mm	M6 x 0.50	12 Nm
3 mm	M8 x 0.50	12 Nm
5 mm	M10 x 0.75	20 Nm

8. Place the needle in the "closed" position.

6.5 Initial commissioning

DANGER!

Mortal danger due to hydraulic energy!

Hydraulic energy can cause serious or fatal injuries. Hydraulically driven parts can move unexpectedly. If individual parts are damaged, hydraulic fluid may escape under high pressure.

For this reason:

- Only have work undertaken on the hydraulics by trained skilled personnel.
- Prior to starting work on the hydraulic system, first shut it down and de-pressurise it. Fully de-pressurise the accumulator. Check that it is de-pressurised.
- Do not change pressure settings beyond the maximum values.

DANGER!

Risk of injury due to pneumatic energy!

Pneumatic energy can cause very serious injuries. Pneumatically driven parts can move unexpectedly. In the event of damage to individual components, air may escape under high pressure and injure your eyes, for example.

For this reason:

– Work on the pneumatics may only be undertaken by trained skilled personnel.
– Prior to starting work on the pneumatic system, first de-pressurise it. Pay attention to the accumulator. It must also be fully de-pressurised.
– Do not change pressure settings beyond the maximum values.

NOTICE!

Damage due to prematurely putting the hydraulic or pneumatic system into operation!

The system is only sealed at operating temperature.

For this reason:

– Only put the hydraulic or pneumatic system into operation once the system has been heated up to operating temperature.

NOTE!

During initial commissioning, a little smoke may be produced due to the evaporating corrosion inhibitor.

If the hot runner system is cold, there is no positive sealing between nozzles and manifold. Sealing is only achieved by the pretension on reaching the operating temperature.

Prior to initial commissioning of the hot runner system, check using the checklist in .

Standard

Requirements:

- The mould is connected to the cooling circuits and the related system via a hose connection as per the temperature control diagram and the temperature stipulated is set.
- The hot runner system is connected to the control system (see the operating manual for the control system).

NOTE!

The maximum permissible operating pressure in the hot runner system is 2,000 bar.

1. Bring the mould to the stipulated temperature.
2. Warm the hot runner system to the processing temperature using the soft-start function in the control system (see the operating manual for the control system).

NOTICE!

BlueFlow® hot runner nozzle

Size 3 mm, length 20 mm

The nozzle has a very low mass and the thick film heating has a very high power density. To avoid damage to the thick film heating or its complete failure, observe the following instructions:

– Operate the nozzle with a controller and not with the machine controller.
– When starting up the hot runner system, heat the thick film heating of the nozzle in 100 °C increments (100 °C => 200 °C => 300 °C => processing temperature.

3. Starting up: Fill system with low pressure. During this process, observe the injection speed and mould characteristics.

Valve-gate

NOTE!

To achieve appropriate needle speeds (needle closing time 20–40 ms / 7–10 mm travel), the operating valve (hydraulic/pneumatic) must be designed to a corresponding size. Dimension the connection hoses to suit the flow rate. Keep the distance between pressure generation and load (mould) low.

NOTE!

Pay attention to the balancing of the oil feed and oil outlet ducts as well as of the air feed and air outlet ducts.

1. Switch on mould temperature control.

NOTE!

Using the soft-start function, the manifold is warmed up to approx. 100 °C and kept at this temperature for approx. 10 minutes.

2. Warm the manifold to processing temperature using the soft-start function in the controller (see the operating manual for the controller).

NOTE!

To prevent cold material residue in the nozzles, the nozzle temperature on warming up/starting the hot runner system must be set to approx. 20 K higher, taking into account the material data from the manufacturer of the plastic. After reaching the required temperature, the hot runner must be heated through for 10 minutes. Only then is it allowed to actuate the needles and start with the injection. In addition, the hot runner should always be shut down with the needles closed so the needles do not have to expel cold material from the PM pieces the first time they are closed.

3. Ensure prior to actuating the drive that the specified processing temperature for the plastic has been reached.

Sequence of an injection cycle:

- Cycle start
- Open the needle
- Injection start
- Holding pressure
- Close the needle
- Cooling time
- Eject
- Cycle end

NOTE!

During initial commissioning, several injection operations may be necessary to completely fill the hot runner with plastic. Until complete part filling is achieved, the cavities must be checked for parts that have not been completely filled at the end of every cycle. For the final check, use the "Hot runner system checklist" (see section "Appendix").

Recommendation for process parameters on the valve-gate

- The holding pressure and the holding pressure time should be set as low as possible.
- The nozzle and mould temperature should be in the upper third of the temperature range specified by the material manufacturer. This setting should ensure that the needle can close without problems and no damage to the components can be produced by already solidified plastic in the injection gate. The settings can be optimised starting from this point.
- If the needle no longer closes completely, the upper limit for the holding pressure time has been reached. The holding pressure time should then be reduced again by approx. 5-10%.

6.6 Comments/notes

6.6.1 Gate

- The function of the hot runner nozzle is significantly affected by the diameter øD (Fig. 34) of the gate.

NOTE!

98% of all faults on commissioning a mould are due to the incorrect design of the gate geometry.

Gate geometry

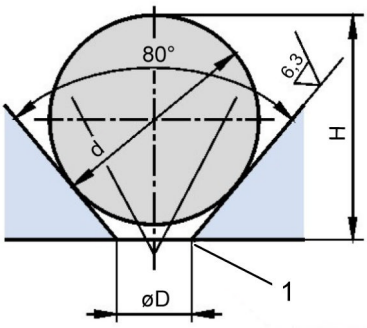


Fig. 34: Gate geometry

- The correct position of the 80° chamfer is checked using a measuring ball.
- The gate must increase in size with the 80° chamfer. The edge (1) must be sharp for clean separation.

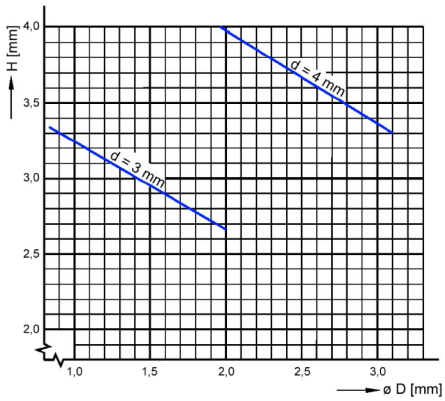


Fig. 35: Checking the gate

- Sheet for determining the gate

Gate diameter < 1.2 mm

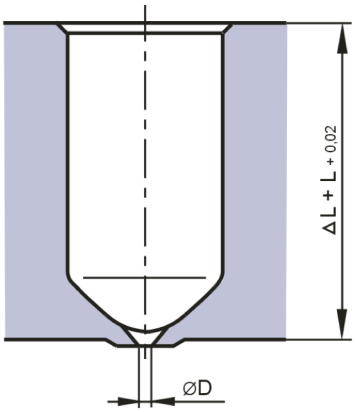


Fig. 36: Installing the nozzle in recessed position

- For a gate diameter smaller than øD = 1.2 mm the nozzle must be fitted in a recessed position. You can take the values for ΔL from the “Delta Tool" tables in the appendix.

NOTE!

You can download the Delta Tool program for determining ΔL on our website, www.guenther-hotrunner.com.

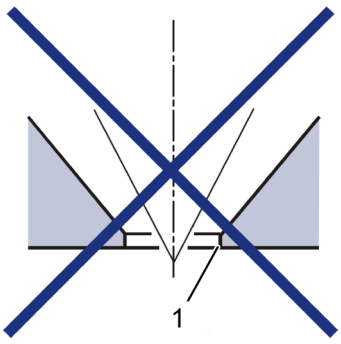


Fig. 37: Re-working the gate point

- Re-working the gate by drilling out is incorrect. The gate must be eroded to the required diameter at 80°, as a cylindrical portion (1) results in a higher separation residue and the flow gap around the tip remains almost unchanged.

6.6.2 Gating against an inclined surface

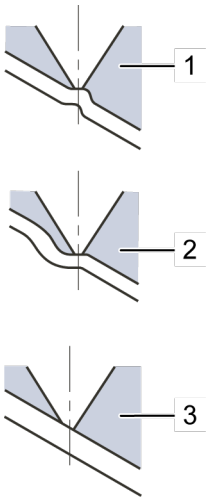


Fig. 38: Gating against an inclined surface

- To achieve even and defined separation at the injection gate, if possible gating should always be against a flat surface as far as possible. Varying separation can result in fluctuations in the production process.

1 - advantageous

2 - advantageous

3 - disadvantageous

6.6.3 Gating via an intermediate gate

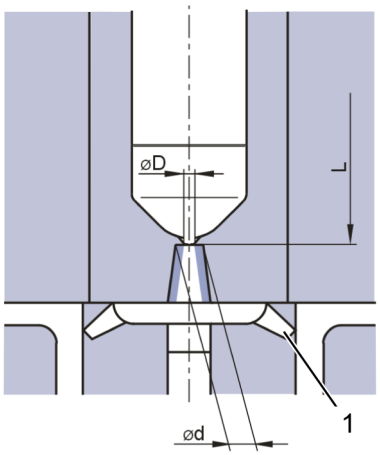


Fig. 39: Gating via an intermediate gate

- To obtain a defined, even separation, the diameter ød must be 0.5 mm larger all round than the diameter øD. The injection gate has the same diameter as the intermediate gate. If possible, employ a catch pit (1) in the intermediate gate.

6.6.4 Reverse gating on a high-gloss visible surface

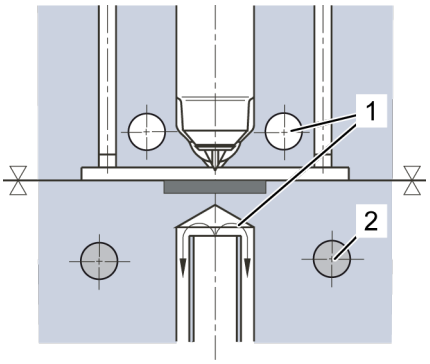


Fig. 40: Reverse gating

- For the gate area beside the nozzle and on the ejector side, adequate cooling is recommended to be able to dissipate the additional heat caused by shearing. It is imperative that the cooling circuits (1) are operated separately from the other temperature control circuits (2).

7 Operation

7.1 Safety

Personal protective equipment

Protective equipment:
- Protective clothing
- Safety shoes
- Safety glasses

Incorrect operation

WARNING!

Risk of injury from incorrect operation!

Incorrect operation could cause severe injuries or material damage.

For this reason:

– Carry out all operating steps as per the information in this operating manual.
– Before beginning work, ensure that all covers and safety features are installed and functioning correctly.
– Never disable safety features during operation.
– Ensure that the work area is clean and tidy. Loose components or tools stacked on top of each other or lying around could cause accidents.

7.2 Switching on

See the operating manual for the injection moulding machine and notes in ↳ *Chapter 6 „Installation and initial commissioning“ on page 30*.

7.3 Switching off

See the operating manual for the injection moulding machine and notes in ↳ *Chapter 6 „Installation and initial commissioning“ on page 30*.

When shutting down the hot runner system, all control circuits can be switched off at the same time.

NOTICE!

Damage due to improper shutdown!

A build up of heat after shutting down can cause damage to the hot runner system.

For this reason:

– Place the needles in the "closed" position.
– Leave the mould cooling to run at around 30 °C for around 30 minutes.

7.4 Activities in the event of a process interruption

Pay attention to the following points in the event of a process interruption:

- Place the needles in the "closed" position.
- Lower the hot runner temperature by 50 °C to 100 °C depending on the material and time at standstill.
- To prevent damage to the gate bores and needles due to cold material, do not actuate the needles when the injection moulding machine is in set-up mode or when purging the unit.

The specific processing temperature for the plastic must be reached prior to actuating the drive.

- If the melt is purged through the open mould/the hot runner, open the needles when injecting through and close during the dosing phase.

7.5 Colour change

See the operating manual of the manufacturer of the injection moulding machine. Also pay attention to the following points:

NOTE!

The specific processing temperature for the plastic must be reached prior to actuating the drive.

- Increase the hot runner temperature by approx. 20 °C (maximum upper processing temperature).
- Continue processing with the new colour.
- If necessary, continue processing with higher injection pressure and/or higher injection speed.
- For very small shot weights, it is recommended to first inject through the open mould – however only with back pressure or with low injection pressure.

NOTE!

– *Evaluate the design of the mould.*
– *Ensure the inserts/mould plates are adequately bolted in place.*
– *_TT nozzle must remain fitted in the cavity plate to avoid damage to the system.*

- If fitted: Clean the mould at a 2nd parting line (for colour change, maintenance or repair work on the hot runner nozzles) and hot runner nozzles (in particular the gate area).
- Lower the hot runner temperature again and optimise.

NOTE!

For a quicker colour change, it is recommended to use cleaning granulate. Various trials have shown that by using cleaning granulate, a colour change can also be performed with good results even with TPE. During this process the different temperature ranges of the cleaning granulate must be taken into account.

7.6 Shutting down in the event of an emergency

In dangerous situations, machine movements must be stopped as quickly as possible and the energy supply must be shut off.

Shutting down in the event of an emergency

Proceed as follows in a dangerous situation:

1. Immediately trigger an emergency stop.
2. If doing so does not endanger your own safety, retrieve persons from the hazard area and administer first aid.
3. Alert a doctor and the fire brigade.
4. Inform the responsible persons at the operating site.
5. Switch the main switch off and secure it against restarting.
6. Keep access routes free for emergency vehicles.

After the emergency measures:

7. If the severity of the emergency requires it, inform the relevant authorities.
8. Task qualified personnel with resolving the malfunction.

WARNING!

Mortal danger due to restarting too early!

Restarting too early results in mortal danger for any persons in the hazard area.

For this reason:

– Before restarting, ensure there is nobody in the hazard area.

9. Check the system before putting back into operation, and ensure that all safety features are installed and functional.

8 Malfunctions

The following chapter describes possible causes for malfunctions and the work required to resolve them.

In the event of repeated malfunctions, shorten the maintenance intervals in accordance with the actual load.

In the event of malfunctions that cannot be resolved with the following information, contact the manufacturer. See the service address on page 2.

8.1 Safety

Personnel

- The troubleshooting work described here, unless indicated otherwise, can be carried out by the operator.
- Some work may only be carried out by specially qualified personnel or exclusively by the manufacturer - this is indicated in the description of the individual malfunctions.
- Work on the electrical system is only allowed to be undertaken by electricians.

Personal protective equipment

Protective equipment:
- Protective clothing
- Safety shoes
- Safety glasses

NOTE!

Specific reference is made in the warnings in this section to additional protective equipment that is to be worn for specific tasks.

Electrical system

DANGER!

Mortal danger due to electrical power!

There is a risk of fatal injury upon contact with current-carrying components. Electrical components that are switched on could move in an uncontrolled fashion and cause severe injuries.

For this reason:

– Before beginning work, switch off the power supply and secure it against restarting.

Securing against restarting

DANGER!

Mortal danger due to unauthorised restarting!

For work on fault resolution, there is a risk that the power supply could be restarted without authorisation. This results in mortal danger for any persons in the hazard area.

For this reason:

– Before beginning work, switch off all power supplies and secure against restarting.

Incorrect troubleshooting

WARNING!

Risk of injury from incorrect troubleshooting!

Incorrect troubleshooting could cause severe injuries or material damage.

For this reason:

– Before beginning work, ensure that there is enough space for the installation.
– Ensure that the installation location is clean and tidy. Loose components or tools stacked on top of each other or lying around could cause accidents.
– If components were removed, ensure they are reinstalled correctly, reinstall all fastening elements and observe the correct screw tightening torques.

Hot surfaces

CAUTION!

Risk of burns due to hot surfaces!

Contact with hot components can cause burns.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.
– Prior to all work, ensure all components have cooled to ambient temperature.

NOTICE!

For controllers, depending on the frequency of use and the ambient conditions, calibration in accordance with BGV A3 must be performed at least once a year (see the operating manual for controllers).

Behaviour in the event of malfunctions

In general, the following applies:

1. For malfunctions that present an immediate danger for persons or material assets, immediately trigger an emergency stop.
2. Determine the cause of the malfunction.
3. If the malfunction rectification work takes place in the hazard area, switch the unit off and secure it against restarting.
4. Immediately inform the responsible persons at the operating site about the malfunction.
5. Depending on the type of malfunction, have it rectified by authorised skilled personnel, or rectify it yourself.

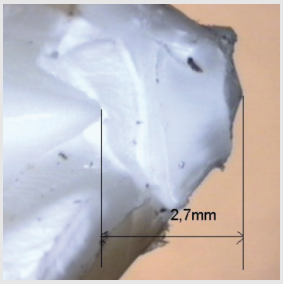
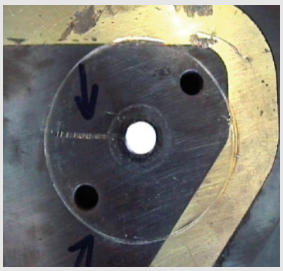
NOTE!

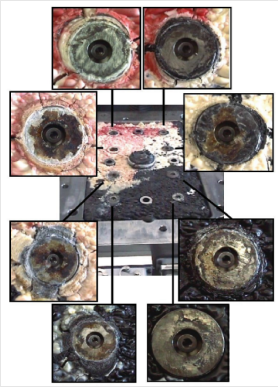
The table of malfunctions below provides information on who is authorised to rectify the malfunction.

8.2 Table of faults

8.2.1 Defects

Defect	Problem	Fault correction	Resolved by
Foreign body in the injection gate 	■ Higher nozzle temperature than usual ■ Injection gate quality poorer ■ Smearing on the item ■ Item is sometimes complete, sometimes not	■ Clean nozzles (see section *„Cleaning nozzles“*) ■ Use a melt filter (pay attention to pressure losses)	Qualified personnel
Foreign body in the nozzle/material tube 	■ Black and fan-shaped burns spread over the entire item ■ Actual temperature at the nozzle fluctuates during injection by ± 20 K	Remove foreign body from the hot runner nozzle, remove material tube/nozzle tip	Qualified personnel

Defect	Problem	Fault correction	Resolved by
Nozzle in contact in the fore chamber area 	■ Insulation gap inadequate ■ Higher temperatures necessary ■ High temperature fluctuations ■ Stringing	Adapt fore chamber geometry to the GÜNTHER specifications	Qualified personnel
Dimension „ *L*“ in the mould too large 	The tip is too far back at the injection gate and is not adequately supplied with heat Example: The dimension „*L*“ has been manufactured too large by the toolmaker: Required: 200.00 mm; Actual: 202.7 mm	Change the installation dimension „*L*“ to suit the specification of 200.00 mm	Qualified personnel
Leaking system 	Metal O-ring	After extensive trials and analyses, GÜNTHER Heisskanaltechnik has decided not to fit metal O-rings in nozzles, connecting pieces, connecting nozzles and hot runner systems.	
	Deep scratches on the sealing surface	Rework the surface of the manifold	Qualified personnel

Defect	Problem	Fault correction	Resolved by
	■ No pretension on the manifold ■ K dimension too large ■ Screws stretched	■ Check the K dimension (or Delta Tool Program) ■ Check the number of screws and screw quality	Qualified personnel
Excessively high separation at the injection gate 	■ Cylindrical portion at the injection gate ■ Foreign body in the injection gate ■ Injection gate is damaged or broken off	■ Adapt injection gate geometry (reduce cylindrical portion) ■ Clean nozzle (see section *„Cleaning nozzle“*) ■ Re-work injection gate	Qualified personnel

8.2.2 Valve-gate system

Needle does not close correctly

Cause of fault	Explanation	Fault correction	Resolved by
The pressure to close the needle is too low	The needle closing force is too low	Increase pressure depending on type of drive (pneumatic max. 10 bar, hydraulicmax. 60 bar)	Qualified personnel
The needles are incorrectly adjusted or the lock nut on the adjusting screw has come loose		Re-adjust needle and fix adjusting nut (see section *„Notes on the valve-gate“*)	Qualified personnel
Incorrect control signal	The "Close needle" command arrives too late or too early	Check control signal, change program if necessary	Qualified personnel
Diameter of the pipework (pneumatic/ hydraulic hoses) is too small	The hose diameter is too small for the required amount of oil/air	Adjust diameter; use hoses as short as possible	Qualified personnel
The mechanism is jammed by soiling or damage	Broken metal parts, chips or similar are jamming the mechanism	Check mechanism and clean or repair	Qualified personnel

Cause of fault	Explanation	Fault correction	Resolved by
Holding pressure time too long	The material in the injection gate area has already solidified	Reduce holding pressure time and increase temperature in the gating area	Qualified personnel
The pneumatic and hydraulic lines are reversed (opening – closing)		Change lines	Qualified personnel

8.3 Putting back into operation after resolving a fault

After the rectification of the malfunction, perform the following steps to place back in operation:

1. Reset emergency stop equipment.
2. Acknowledge the malfunction on the controller.
3. Ensure there is nobody in the hazard area.
4. Start as per the instructions in the section *Chapter 6.5 „Initial commissioning“ on page 45*.

9 Maintenance

9.1 Safety

Personnel

- The maintenance work described here, unless indicated otherwise, can be carried out by the operator.
- Some maintenance work may only be carried out by specially qualified personnel or exclusively by the manufacturer - this is indicated in the description of the individual maintenance work.
- Work on the electrical system is only allowed to be undertaken by electricians.

Personal protective equipment

Protective equipment:

- Protective clothing
- Safety shoes
- Safety glasses

NOTE!

Specific reference is made in the warnings in this section to additional protective equipment that is to be worn for specific tasks.

Electrical system

DANGER!

Mortal danger due to electrical power!

There is a risk of fatal injury upon contact with current-carrying components. Electrical components that are switched on could move in an uncontrolled fashion and cause severe injuries.

For this reason:

– Before beginning work, switch off the power supply and secure it against restarting.

NOTICE!

For controllers, depending on the frequency of use and the ambient conditions, calibration in accordance with BGV A3 must be performed at least once a year (see the operating manual for controllers).

Securing against restarting

DANGER!

Mortal danger due to unauthorised restarting!

During maintenance work, there is a risk that the power supply could be restarted without authorisation. This results in mortal danger for any persons in the hazard area.

For this reason:

– Before beginning work, switch off all power supplies and secure against restarting.

Incorrectly performed maintenance work

WARNING!

Risk of injury from incorrectly performed maintenance work!

Incorrect maintenance could cause severe injuries or material damage.

For this reason:

– Before beginning work, ensure that there is enough space for the installation.
– Ensure that the installation location is clean and tidy. Loose components or tools stacked on top of each other or lying around could cause accidents.
– If components were removed, ensure they are reinstalled correctly, reinstall all fastening elements and observe the correct screw tightening torques.

Hot surfaces

CAUTION!

Risk of burns due to hot surfaces!

Contact with hot components can cause burns.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.
– Prior to all work, ensure all components have cooled to ambient temperature.

Environmental protection

The following information on environmental protection must be observed during maintenance work:

- On all lubrication points that are lubricated manually, remove any escaping, used or excess grease and dispose of it according to the local applicable regulations.
- Collect replaced oils in a suitable container and dispose of them according to the local applicable regulations.

9.2 Maintenance plan

The following sections describe the maintenance work required for optimal and malfunction-free operation.

If regular controls reveal a higher level of wear, shorten the required maintenance intervals according to the actual signs of wear.

If you have questions on the maintenance work and intervals, contact the manufacturer. See the service address on page 2.

Interval	Maintenance work	To be undertaken by
As required	Clean the nozzle	Qualified personnel
	Clean the needle	Qualified personnel
	Clean the manifold	Qualified personnel
	Check the sliding cam mechanism for wear	Qualified personnel
Every 150,000 shots or weekly	Lubricate the sliding cam mechanism	Qualified personnel
Every 200,000 shots (on usage of thermoplastic elastomer (TPE) or polymers for which the viscosity is heavily reduced by shearing)	Clean the needle drive mechanism	Qualified personnel
Approx every 400,000 shots (depending on the material to be processed and the application)	Clean the needle drive mechanism	Qualified personnel

9.3 Maintenance work

9.3.1 Cleaning the nozzle

Protective equipment:
- Protective clothing
- Safety shoes
- Protective gloves
- Light face mask
- Facial protection

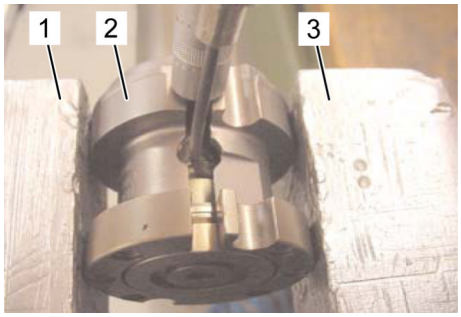


Fig. 41: Clamping the nozzle

1. Remove the nozzle (*Chapter 10.3 „"Hot half" disassembly“ on page 85*).

CAUTION!

Damage due to incorrect clamping of the nozzle!

If the nozzle is clamped incorrectly, the material tube may also rotate on drilling out the plastic. This could cause damage to the heater and/or thermocouple connections.

For this reason:

– Always clamp the nozzle at the nozzle housing.

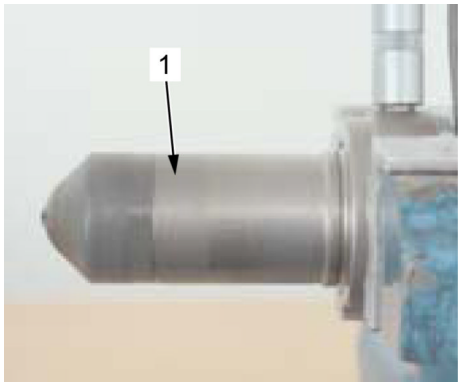


Fig. 42: Cross-section reduction

2. Clamp the nozzle at the nozzle housing (2) in a vice fitted with aluminium jaws (1 and 3).

CAUTION!

Damage due to inserting the drill too far!

On drilling out the plastic, ensure you do not drill too far into the material tube, as the cross-section of the bore reduces at point (1). The drilling depth is dependent on the nozzle type and the nozzle length.

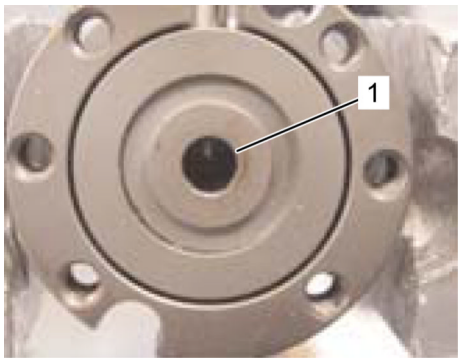


Fig. 43: Material tube

3. Using a battery-powered screwdriver/drill, remove the plastic from the material tube (1).

NOTE!

The diameter of the drill must be 0.2 mm to 0.5 mm smaller than the diameter of the material tube. The material tube diameter is dependent on the nozzle type.

CAUTION!
Risk of injury due to hot surfaces!
You may suffer burns on touching the nozzle.

For this reason:

– After warming up the nozzle, only pick it up using the connections (1).

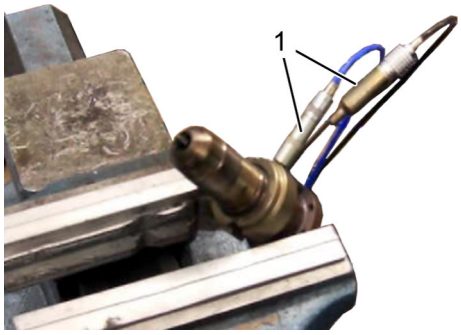


Fig. 44: Connections

4. Connect the nozzle to a controller and warm it to the processing temperature for the plastic.

NOTICE!
BlueFlow® hot runner nozzle
Size 3 mm, length 20 mm

The nozzle has a very low mass and the thick film heating has a very high power density. To avoid damage to the thick film heating or its complete failure, observe the following instructions:

– Operate the nozzle with a controller and not with the machine controller.
– When starting up the hot runner system, heat the thick film heating of the nozzle in 100 °C increments (100 °C => 200 °C => 300 °C => processing temperature.

NOTICE!

Damage due to improper removal of the insulating cap!

On pulling off the insulating cap, the nozzle tip may come undone if the cap is rotated to the left. If it is rotated to the right, the nozzle tip may be damaged.

For this reason:

– Only pull off the insulating cap when it is warm.
– Always pull off the insulating cap straight to the front.

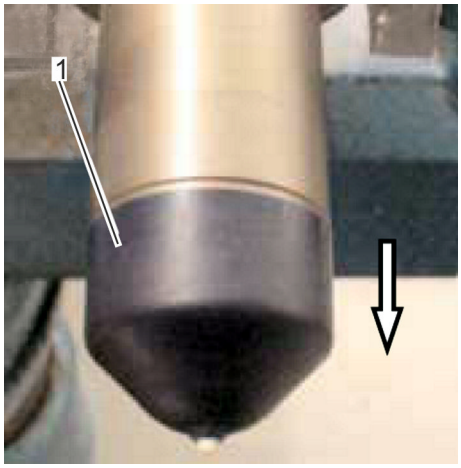


Fig. 45: Removing the insulating cap

5. Pull off the insulating cap (1) straight to the front.
6. Set the nozzle to 20 to 30 °C above the processing temperature for the plastic.

CAUTION!

Risk of injury due to hot plastic!

You may suffer burns on contact with the plastic expelled.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.
– Ensure nobody can be hit by the plastic expelled.

7. Apply several compressed air pulses to the material tube.
8. Remove the plastic expelled at the nozzle tip (1) using a brass brush (2).

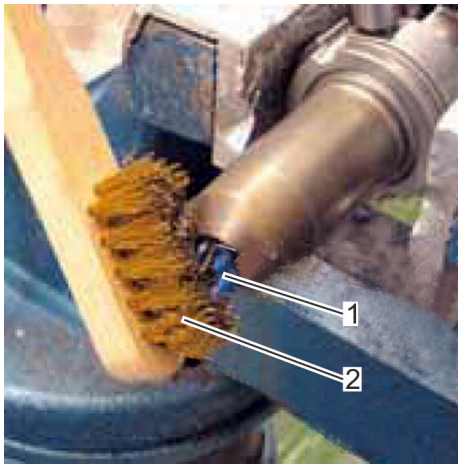


Fig. 46: Removing plastic

Fig. 47: Wire brush

Check the nozzle temperature at the nozzle tip:

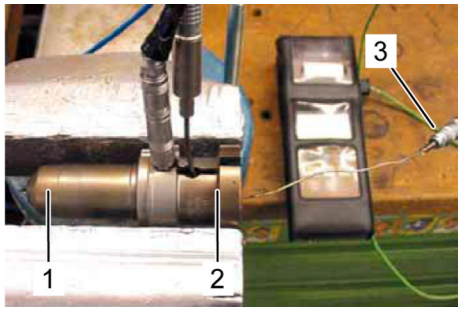


Fig. 48: Measuring position for external temperature measurement

Check the nozzle temperature on the nozzle head:

9. Using a round wire brush clamped in the battery-operated drill, brush out the material tube.

The diameter of the wire brush should be same as the diameter of the material tube.

10. Repeat steps 7 to 9 until no more plastic is expelled at the nozzle or the material tube.

11. Warm the nozzle to a specific temperature.

12. Insert an external thermometer (3) from the rear into the material tube and push into the nozzle to the nozzle tip stop (1).

13. Compare the temperature with the required temperature set.

The temperature measured at the nozzle tip is around 10 °C below the required temperature set on the controller.

14. Insert an external thermometer (3) into position (2) (around 10 mm from the nozzle/manifold contact face) into the material tube from the rear.

15. Compare the temperature with the required temperature set.

NOTE!

The temperature measured is around 80 to 90 °C below the required temperature set on the controller. When installed, this temperature difference is compensated in conjunction with a hot manifold.

NOTE!

If the temperature measurement is made with a flat temperature sensor applied directly to the nozzle tip, the result measured will be incorrect. The temperature measured on the nozzle tip is significantly below the temperature that is actually present in the nozzle.

NOTE!

Have damaged or worn nozzle tips replaced by GÜNTHER (for contact data see page 2). In general, it is possible to replace nozzle tips within a day.

9.3.2 Measuring nozzle temperature inside the mould

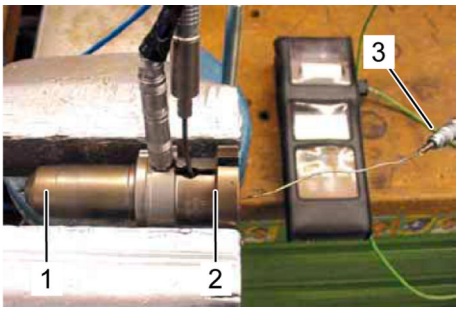


Fig. 49: Measuring position for external temperature measurement

1. Insert an external thermometer (3) from the rear into the material tube to the nozzle tip stop.
2. Pull the thermometer out around 10 to 15 mm.
3. Compare the temperature with the required temperature set.

NOTE!

Have damaged or worn nozzle tips replaced by GÜNTHER (for contact data see page 2). In general, it is possible to replace nozzle tips within a day.

9.3.3 Cleaning the needle

- Only to be undertaken by appropriately qualified personnel.

Protective equipment:
- Protective clothing
- Safety shoes
- Protective gloves
- Light face mask
- Facial protection

NOTICE!
Damage due to improper cleaning!
Improper cleaning can cause damage to the needle.
For this reason:
– Do not clean the needle by sand blasting.
– Do not use abrasive procedures for cleaning.

1. Remove the needle (*Chapter 10.2 „Removal of the needle“ on page 83*).
2. Clean the needle using a brass brush or a very fine cloth.

NOTE!
Useful aids for loosening the plastic:
– *Cleaning spray manufactured by Klüber Chemie (Lusin Clean L 21)*
– *Solvent, e.g. acetone*
– *Cloth manufactured by Kingspor (Micro Fine Grey, article number 264053)*

What to do if the plastic cannot be removed using solvents

3. Heat the needle to maximum 400 °C using a gas flame.
4. Remove plastic residue using a brass brush.
5. Leave the needle to cool to ambient temperature.
6. Install the needle (*Chapter 6.3.4 „Installation of the needle“ on page 42*).

9.3.4 Cleaning the manifold

- Only to be undertaken by appropriately qualified personnel.

Protective equipment:
- Protective clothing
- Safety shoes
- Protective gloves
- Light face mask
- Safety glasses

Requirement

- Nozzles and needles are removed.
- Remove the manifold. To do so:

1. Unscrew the sockets for the power cable.
2. Remove the ceramic sleeves (if necessary, break).
3. Undo the setscrews (if necessary, drill out).

- Unscrew the threaded plug. To do so:

1. Hit the threaded plug hard using a drift.
2. Unscrew the threaded plug.

- If it is not possible to unscrew the threaded plug:

1. Heat the manifold or use penetrating spray (e.g. "Multigliss").
2. If the hex breaks off, mill out the threaded plug.
3. Align the thread bore using a locating device.
4. Mill out the core to the sealing plug.
5. Re-cut the thread.

- Remove the assembly seals for valve-gate systems.
  To do so:

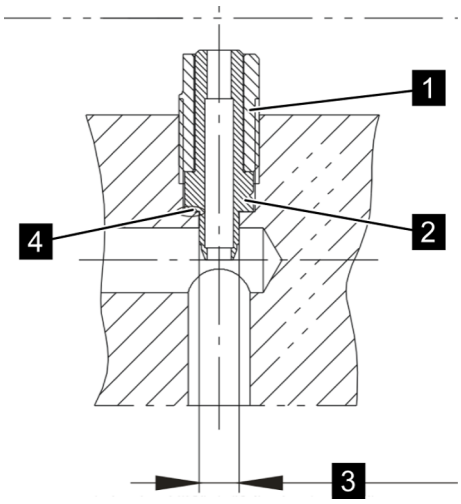


Fig. 50

1. Remove the plastic from the riser bore in the manifold using a drill. Do not damage the surface during this process.
2. Unscrew the union nut (1).
3. Hammer out the assembly seal 3 (2) to the rear using a suitable drift (diameter < 5 mm (4 mm for assembly seal 2) made of brass or copper). If necessary, slightly heat the area around the assembly seal using a gas burner.

Also pay attention to the following information:

- On the new components, there is an M5 auxiliary thread for removal using a hammer-action puller.
- Do not heat the manifold so much that the plastic is damaged or runs into the fit.
- Do not damage the fit (3) or the sealing surface (4).
- "Assembly seal 3" stands for needle diameter 3 mm.

Thermal

Cleaning is undertaken using a pyrolysis technique or fluidised bed cleaning.

NOTE!

On manifolds with shrunk deflection plugs, these are the only techniques that are suitable or possible.

Mechanical

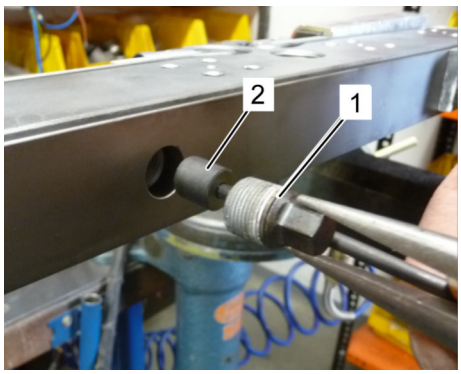


Fig. 51: Removing plugs

1. Remove the threaded plug (1) and the sealing plug (2).
2. On manifolds for valve gate systems, remove the assembly seals for the needles (↳ *„Requirements“ on page 44*).

Fig. 52: Removing plastic

3. Using a battery-powered screwdriver/drill, remove the plastic from the material ducts.

NOTE!

The drill diameter must be 0.2 mm to 0.5 mm smaller than the diameter of the material duct to prevent damage to the surface of the ducts.

4. Using a round wire brush clamped in the battery-operated drill, brush out the material ducts.

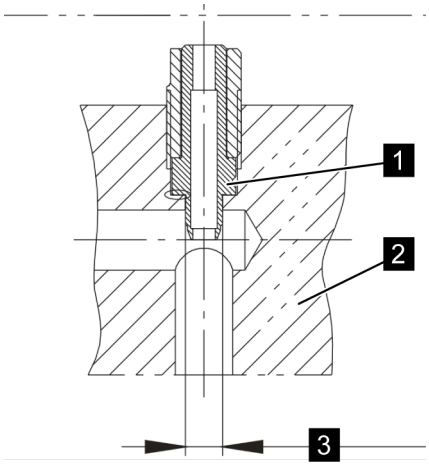


Fig. 53: Protecting the seal

5. Sand-blast the manifold.

NOTE!

On manifolds (2) for valve gate systems, the fits (3) in the assembly seals (1) must be protected against the blasting medium.

Fitting the manifold

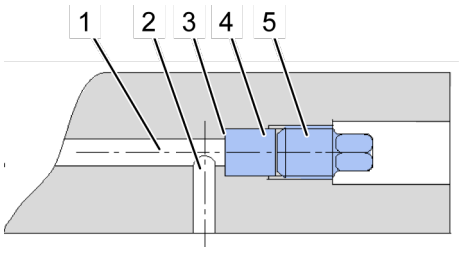


Fig. 54: Manifold

1 Cross bore
2 Nozzle outlet bore
3 Sealing surface
4 Sealing plug
5 Threaded plug

1. Clean the sealing surface (6) (abrasive pin).

2. Mark or paint the sealing plug (4) with engineer's blue.

3. Fit the sealing plug (4).

4. Screw in the threaded plug (5) and tighten with a torque wrench as per the following table.

Threaded plug	Value	Unit
M10 x 1	30	Nm
M12 x 1	75	Nm
M14 x 1	80	Nm
M16 x 1.5	100	Nm
M18 x 1.5	120	Nm
M20 x 1.5	180	Nm
M24 x 2	200	Nm

Note

– *In valve gate systems, the tightening torque is 20 Nm lower in the area of fit H5 – sealing element.*

– *In area Ø 8 mm: M12 x 1.35 with 40 Nm.*

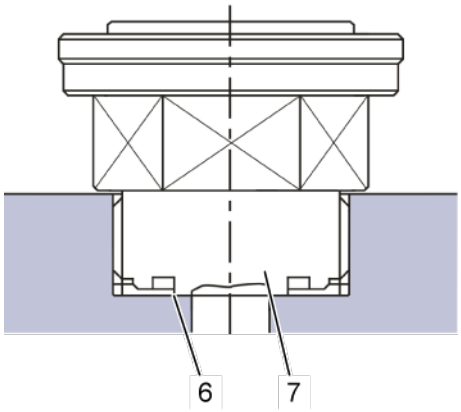


Fig. 55: Connection element

6 Sealing surface
7 Connection element

5. Unscrew the threaded plug (5) and remove the sealing plug (4).
6. Check the imprint. Ensure the imprint and the sealing surface are correct.
7. Fit the sealing plug (4).
8. Screw in the threaded plug (5) and tighten with a torque wrench as per the table in step 4.
9. Work the surface of the manifold using an orbital sander (fine grade emery paper). Ensure all sealing surfaces are in good condition.
10. Mark or paint the sealing surface (6) on the connection flange (7) with engineer's blue.
11. Screw in the connection flange (7) and tighten with a tightening torque of 200 Nm.
12. Unscrew the connection element (7).
13. Check the imprint. Ensure the imprint and the sealing surface (6) are correct.
14. Fit the connection element (7) and tighten with a tightening torque of 200 Nm.

Fitting power cables

1. Tighten the setscrews.
2. Fit the ceramic sleeve.
3. Screw in the socket.
4. Fit the earth cable.

5. Fit the thermocouple.
6. Check the power cable for continuity/connection to ground (meter).
7. Warm the manifold and check the required/actual temperature.

Fitting assembly seals for valve gate systems

1. Check the fit and the sealing surface for damage or soiling. If necessary, clean using fine emery paper or a round wire brush (not using the drill).
2. Fit the new assembly seal and check for correct seating (measure).
3. Screw in the thread for the union nut and tighten to a torque of 30 Nm.

9.3.5 Replacing O-ring seals on single needle valves

- Only to be undertaken by a skilled person from GÜNTHER or on-site at GÜNTHER.
- Material: Seal set
- Tools and materials: Floss, O-ring grease, auxiliary thread, hammer-action puller

NOTICE!

GÜNTHER only provides a warranty for single needle valves if they are installed and maintained on-site at GÜNTHER or by a skilled person from GÜNTHER. GÜNTHER accepts no liability for damage due to the incorrect installation of the O-rings on hydraulically/pneumatically operated single needle valves by the purchaser, his/her representative or contractor. This also applies to improper maintenance or the failure to perform maintenance.

CAUTION!

Risk of burns due to hot surfaces!

Contact with hot components can cause burns.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.

1. Warm the hot runner system to the processing temperature (see the operating manual for the machine's control system).
2. Undo the cover and remove it using the auxiliary thread.
3. Remove the needle together with the piston using the auxiliary thread and hammer-action puller (↳ *Chapter 10.2 „Removal of the needle“ on page 83*).
4. Remove the O-rings on the piston.
5. Clean the piston and cylinder. The grooves in the single needle valve must be clean and free of grease.
6. Fit the new O-rings (1) to the piston (2).

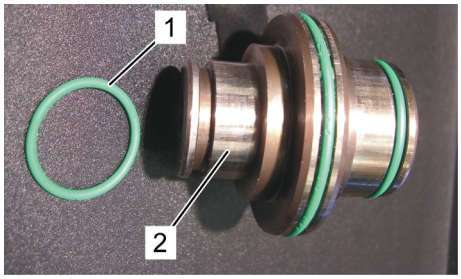


Fig. 56: Fitting O-rings

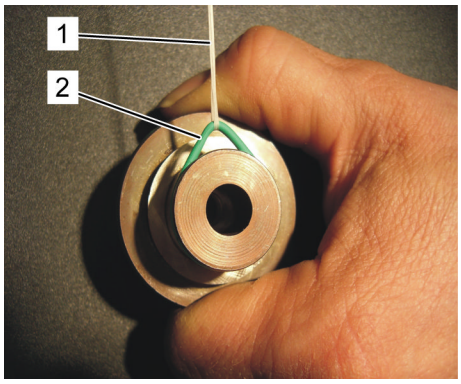


Fig. 57: Aligning O-rings

7. Align the O-rings (2) using the floss (1). To do so, fit the floss as shown and move around the O-ring in circles several times.

> *NOTE!*
>
> *This step is necessary, as the twisting that occurs on fitting the O-rings would significantly reduce the service life.*

8. Wait around 30 minutes until the elongation of the O-rings has reduced.
9. Smear the cylinder surface with O-ring grease (↳ *Chapter 3.3 „Lubricants“ on page 20*).
10. Fit the piston into the cylinder.
11. Install the needle (↳ *Chapter 6.3.4 „Installation of the needle“ on page 42*).
12. Screw the cover tightly into position.
13. Screw the adjusting nut tightly into position.
14. Adjusting the needle (↳ *„Adjusting the needle“ on page 44*).

9.3.6 Re-lubricating the sliding cam mechanism

- Only to be undertaken by appropriately qualified personnel.
- Special tool required:
  – Grease gun

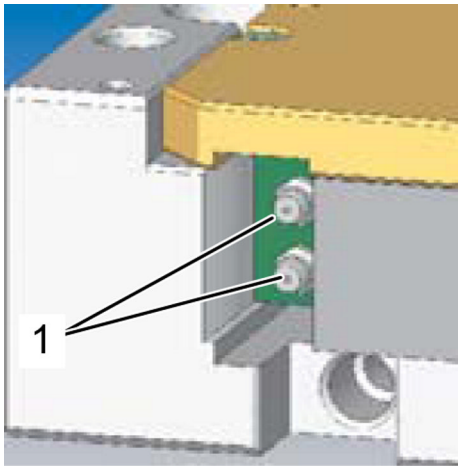


Fig. 58: Re-lubricating the sliding cam mechanism

The sliding cam mechanism can be re-lubricated without disassembly. The grease is pressed in with the aid of a grease gun via the grease nipple (1) that is accessible from the exterior (see the operating manual for the grease gun).

NOTE!

Do not use different greases. Recommended grease manufactured by Klüber Lubrication: Barrierta L55/2 high-temperature long-life grease (for safety data sheet, see www.klueber.de). The grease can be procured via GÜNTHER (for address see page 2) or via the manufacturer.

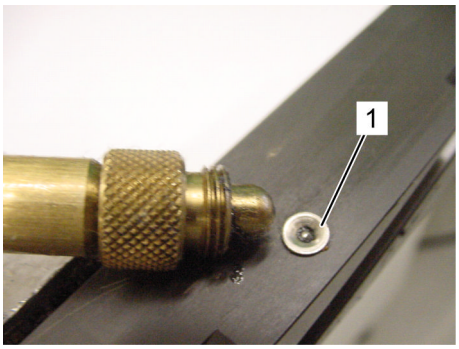


Fig. 59: Ball-valve impact hole

NOTE!

On older hot runner systems, the lubrication of the sliding cam mechanism is undertaken via the existing ball-valve impact holes (1) in accordance with DIN 3410 form F.

NOTE!

To prevent corrosion on hot runner moulds, these are often sprayed with LUSIN PROTECT G11 and O45 corrosion inhibitor manufactured by Klüber. Both inhibitors form an electrically insulating layer if heated (like paint). The corrosion inhibitors have the property of penetrating into the finest hairline cracks and corners. For this reason, it may occur that the contacts on the thermoplug for hot runner nozzles become insulated and, as a result, problems occur.

On spraying the hot runner parts, ensure that the plugs for the thermocouple and power connections are covered or masked prior to spraying so that they are not also sprayed.

9.3.7 Soiling

Using a tyre iron, remove melt that escapes from the seal on the manifold due to the lifting movement of the needle.

NOTE!

To prevent cold material residue in the nozzles, the nozzle temperature on warming up/starting the hot runner system must be set to approx. 20 K higher, taking into account the material data from the manufacturer of the plastic. After reaching the required temperature, the hot runner must be heated through for 10 minutes.

9.4 Tightening torques

9.4.1 General tightening torques

Pretension FV and tightening torque MA, for screws with head bearing surface in accordance with DIN EN ISO 4014

Shaft screws (μ total = 0.125)

Screw size	Pretension FV [N]	Tightening torque MA [Nm]
	12.9	12.9
M4	6,900	4.8
M5	11300	9.5
M6	16,000	16
M8	29,300	40
M10	46,600	79
M12	68,000	135

Note

- *In valve gate systems, the tightening torque is 20 Nm lower in the area of fit H5 – sealing element.*
- *In area Ø 8 mm: M12 x 1.35 with 40 Nm.*

Threaded plug

Size	Value	Unit
M10 x 1	30	Nm
M12 x 1	75	Nm
M14 x 1	80	Nm
M16 x 1.5	100	Nm

Size	Value	Unit
M18 x 1.5	120	Nm
M20 x 1.5	180	Nm
M24 x 2	200	Nm

Tightening torques for the thread for needle adjustment

Needle Ø	Thread	Tightening torque MA [Nm]
Ø 2 mm	M6 x 0.50	12
Ø 3 mm	M8 x 0.50	12
Ø 5 mm	M10 x 0.75	20

9.5 Measures after maintenance

When maintenance work is finished and before switching on again, carry out the following steps:

1. Check that all screw connections that were unscrewed are now seated correctly.
2. Check whether all previously removed safety features and covers have been correctly installed.
3. Ensure that all tools, materials and other equipment used has been removed from the work area.
4. Clean the work area and remove any substances that may have emerged, such as liquids, processing materials or similar.
5. Ensure that all safety features of the plant function correctly.

10 Disassembly

10.1 Safety

Personnel

- **Disassembly is only allowed to be undertaken by specially trained skilled personnel.**
- **Work on the electrical system is only allowed to be undertaken by electricians.**

Electrical system

DANGER!

Mortal danger due to electrical power!

There is a risk of fatal injury upon contact with current-carrying components. Electrical components that are switched on could move in an uncontrolled fashion and cause severe injuries.

For this reason:

– Before beginning disassembly, switch off the power supply and disconnect it permanently.

Hydraulics

WARNING!

Mortal danger due to hydraulic energy!

Hydraulic energy can cause serious or fatal injuries.

Hydraulically driven parts can move unexpectedly.

If individual parts are damaged, hydraulic fluid may escape under high pressure.

For this reason:

– Only have work undertaken on the hydraulics by trained skilled personnel.
– Prior to starting work on the hydraulic system, first shut it down and de-pressurise it. Fully de-pressurise the accumulator. Check that it is de-pressurised.
– Do not change pressure settings beyond the maximum values.

Pneumatics

WARNING!

Risk of injury due to pneumatic energy!

Pneumatic energy can cause very serious injuries.

Pneumatically driven parts can move unexpectedly.

In the event of damage to individual components, air may escape under high pressure and injure your eyes, for example.

For this reason:

- Work on the pneumatics may only be undertaken by trained skilled personnel.
- Prior to starting work on the pneumatic system, first de-pressurise it. Pay attention to the accumulator. It must also be fully de-pressurised.
- Do not change pressure settings beyond the maximum values.

Incorrect disassembly

WARNING!

Risk of injury from incorrect disassembly

Stored residual energy, sharp components, edges and corners on and in the device or on the required tools could cause injuries.

For this reason:

- Before beginning work, ensure that there is enough space.
- Handle open, sharp-edged components carefully.
- Ensure that the work location is clean and tidy. Loose components or tools stacked on top of each other or lying around could cause accidents.
- Disassemble the components correctly. Observe that the components may have a high tare weight. If necessary, use hoists.
- Secure the components so that they do not fall or topple over.
- If in doubt, contact the manufacturer.

CAUTION!
Damage due to improper dismantling!
Improper dismantling can result in damage to the hot runner.

For this reason:

– During the disassembly of the form inserts in conjunction with the needle guide type VA, the needle must be in the "open" position.
– Ensure the hot runner system is switched off.
– Before the system is put back in operation, ensure the needles are in the "closed" position again.

10.2 Removal of the needle

The following steps apply to single needle valves, the lifting plate and sliding cam mechanism.

- Only to be undertaken by appropriately qualified personnel.
- Special tool required:
  – Hammer-action puller
  – Pliers

Protective equipment:
- Protective clothing
- Safety shoes
- Protective gloves

CAUTION!
Risk of burns due to hot surfaces!
Contact with hot components can cause burns.

For this reason:

– During all work near hot components, always wear protective clothing and gloves.

1st variant

NOTE!

For the 1st variant, the needle must be re-adjusted on installation.

1. Warm the hot runner system to the processing temperature (see settings).
2. Undo the adjusting nut (1) from the needle (2).

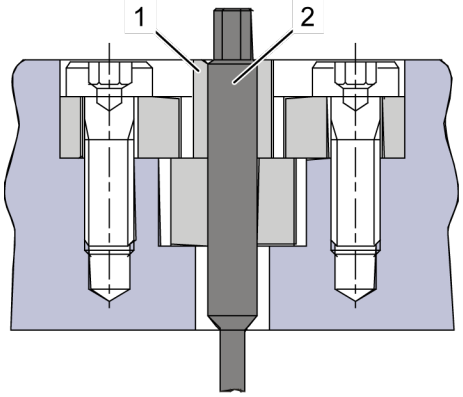


Fig. 60: Undoing the adjusting nut

3. Unscrew the needle (2) from the needle receptacle (1) and pull it out using the hammer-action puller.

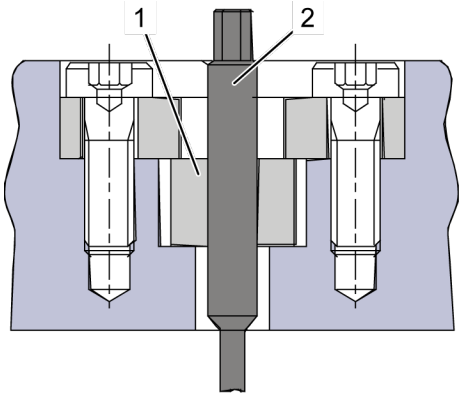


Fig. 61: Unscrewing the needle

2nd variant

NOTE!

On the 2nd variant, the needle does not need to be re-adjusted on installation.

1. Warm the hot runner system to the processing temperature (see settings).

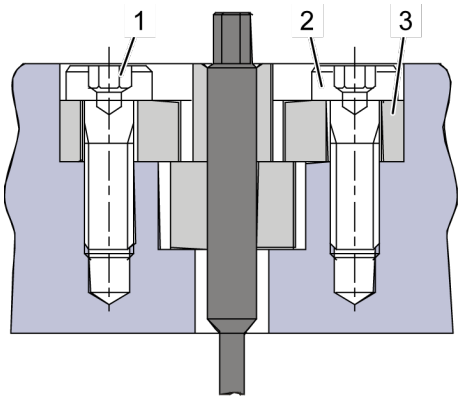


Fig. 62: Removing the cover

2. Unscrew the screws (1) and (2).
3. Remove the cover (3) using the auxiliary thread.

For single needle valves, the following applies:

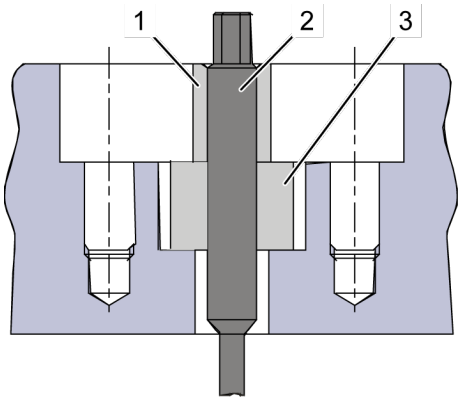


Fig. 63: Removing the needle

4. Remove the adjusting nut (1), needle (2) and piston (3) together using the auxiliary thread and hammer-action puller.

For the lifting plate and sliding cam mechanism:

5. Remove the adjusting nut (1), needle (2) and needle receptacle (3) together using pliers.
6. Mark the needle corresponding to the position in the system.

10.3 "Hot half" disassembly

- Only to be undertaken by appropriately qualified personnel.

DANGER!

Mortal danger due to electrical power!

There is immediate mortal danger upon physical contact with live parts.

For this reason:

– Only have work on the electrical system undertaken by electricians.

1. Disconnect the wiring.
2. Remove the clamping plate (1) from the frame plate (2).

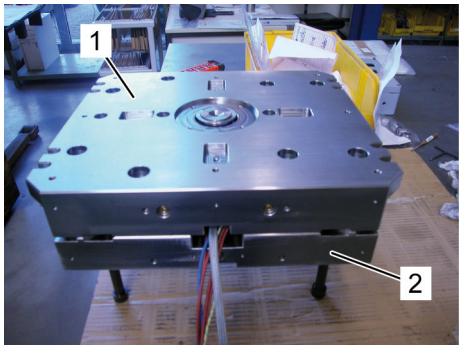


Fig. 64: Removing the clamping plate

3. Remove the nozzles (1) from the frame plate (2).

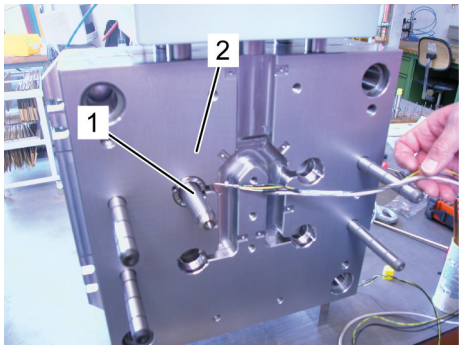


Fig. 65: Removing the nozzles

4. Remove the pressure pads (2) from the manifold (1).
5. Remove the manifold (1) from the frame plate (3).

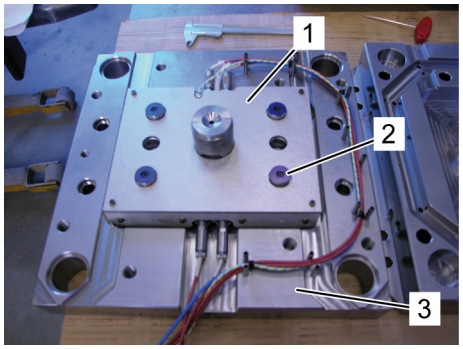


Fig. 66: Removing the pressure pads and manifold

10.4 Disassembly and disposal

Disassembly

Prior to disassembly:

- Switch the unit off and secure it against restarting.
- Physically disconnect all power supplies from the unit, discharge any stored residual energy.
- Remove any oils and greases as well as the remains of any materials processed and dispose of them with due care for the environment.

Then clean the assemblies and components correctly and dismantle them while observing the applicable local health and safety regulations and regulations on the protection of the environment.

Disposal

If an agreement has not been reached on return or disposal, send dismantled components for recycling:

- Scrap metals.
- Send plastic elements for recycling.
- Dispose of remaining components based on their material characteristics.

CAUTION!

Damage to the environment due to incorrect disposal!

Incorrect disposal of materials used causes damage to the environment.

For this reason:

– Correctly dispose of electrical scrap, electronic scrap, lubricants and other oils and greases, or, if necessary, have a specialist organisation dispose of them.

The local authorities or specialist disposal organisations will provide information on correct disposal with due care for the environment.

11 Spare parts list

Spare parts can be found in the main catalogue or on the internet at www.guenther-hotrunner.com.

12 Appendix

12.1 Technical information

You will find further technical data in the main catalogue in the related sections, such as

- *„"Yellow pages"“*
- *„Material-dependent nozzle-selection“* page
- Page for the related nozzle/manifold type

You will find additional service information on our website, www.guenther-heisskanal.de:

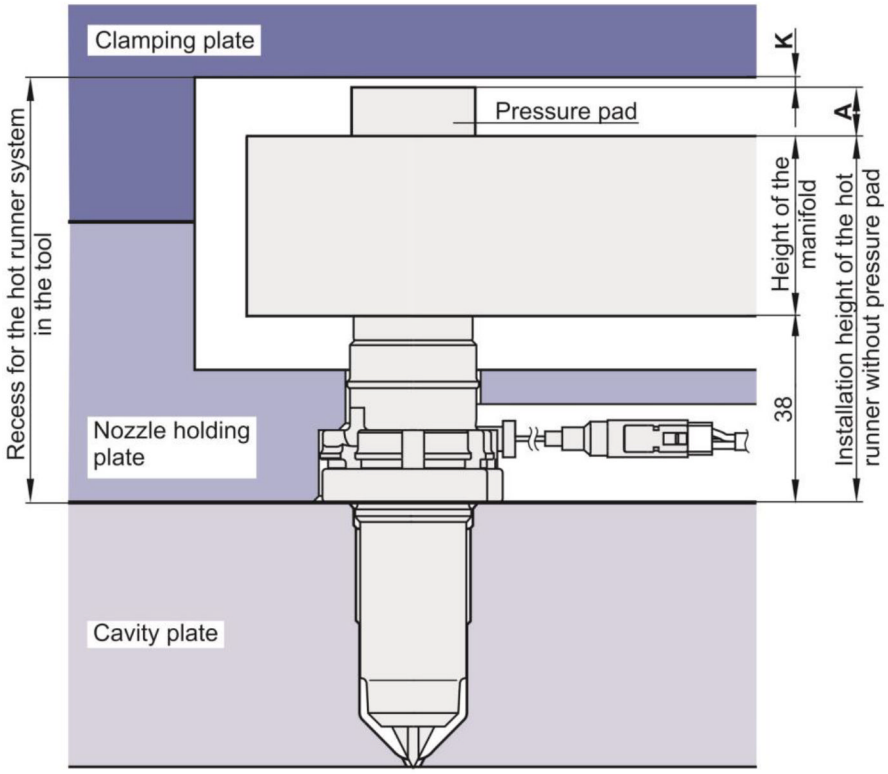
- ***„Service“*** menu
  - Delta Tool calculation program
  - Application database
  - Seminars
- ***„Download“*** menu
  - Main catalogue
  - Operating manual
- ***„About CADHOC“*** menu
  - GÜNTHER system designer CADHOC V2

12.2 Height adjustment/dimension check

Customer: _____ Comments: _____

Order-No.: _____ _____

Tool-No.: _____ _____



Gate point diameter: _____

Note:
If special nozzles or other components with pressure limitation (less than 2000 bar) are fitted into systems or individual moulds, this is documented in the vertical construction and on the nameplate.

Gap for heat expansion "**K**"

K [mm] \ ΔT [°C]	100	150	200	250	300	350
Manifold height **36 mm**	0,021	0,059	0,098	0,137	0,177	0,217
Manifold height **46 mm**	0,033	0,078	0,124	0,170	0,218	0,264
Manifold height **56 mm**	0,046	0,097	0,150	0,203	0,258	0,311

Calculation:

Recess for the hot runner system in the tool _____

Installation height of the hot runner without pressure pad - _____

Measurement **K** - _____

Measurement **A** (Height of pressure pad) = _____

Melt temperature _____ °C

Mould temperature _____ °C

Temperature difference △T _____ °C

Gap for heat expansion "**K**" _____ mm

12.3 Hot runner system checklist

Order confirmation no. :		Customer:	
Hot valve fitted by:			
Hot valve checked by:			

General points

Check cooling bores separately	☐ OK
Check cooling bores in the assembly Run/leaks	☐ OK
Arrangement cavity number / nozzle number see further on, wiring diagram	☐ OK
Insulation resistance >1M Ω	☐ OK
Ground wire resistance < 0.3 Ω	☐ OK
Warming up the hot valve to processing temperature, max 1h	☐ OK
Height adjustment / pretension / K dimension Δ t °C	☐ OK
Tip length Δ t °C	mm
Check guide pin length	☐ OK
Vertical pillars (angled)	☐ OK
Type plate fitted	☐ OK
Transport hooks accessible	☐ OK
Visual impression of the mould	☐ OK
Wiring diagram to the customer	☐ OK
Corrosion inhibitor applied	☐ OK

Valve gate

Barrierta L55/2	☐
Needle guide play correct?	☐ OK
Access to needle adjustment correct?	☐ OK
Needle stroke as per drawing in mm	mm
Needle open/closed position as per drawing	☐ OK
Marking on cylinder (open/closed)	☐ OK
Mechanical function test	☐ OK
Cylinder and supply line free of leaks	☐ OK
1st lubrication through stipulated lubrication ducts performed	☐ OK

12.4 Declaration of conformity

Manufacturer's declaration / declaration of incorporation

In the context of the Machinery directive 2006/42/EC, Annex VII part B for partly completed machinery.

We herewith declare that the unit identified below complies with the provisions of the EC directives noted below. If it is incorporated in another machine, putting into service is prohibited until it has been determined that the machine into which the unit identified below is incorporated is compliant with the provision of the EC Machinery directive 2006/42/EC, Annex VII part B with the applicable Appendix.

Identifier:

Ident number:

Directives taken into account: Low voltage directive 2006/ 95/ EC

Frankenberg, _____

Place and date _____

pp _____

Quality Manager/ Qualitätsleiter _____

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