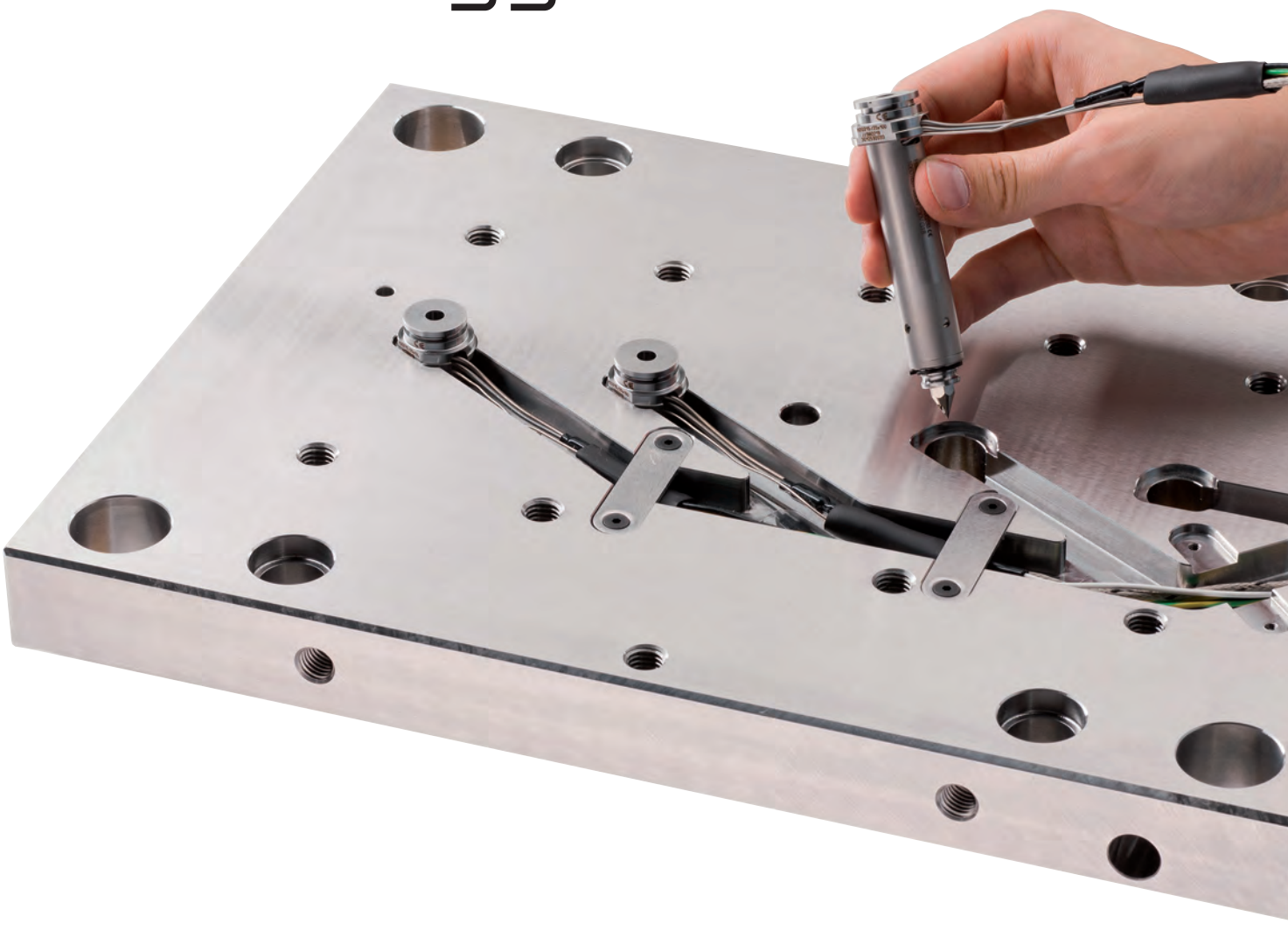
HASCO®
hot runner

Operating instructions

Hot Runner Technology



Built to Run.
Built to Perform.
Built to Innovate.
Built to Simplify.
Built to Improve.
Built to Enable.
Built to Control.

Foreword

Thank you for choosing a HASCO hot runner product.

These operating instructions are intended for everyone who works with HASCO hot runner technology and explain how to safely handle HASCO hot runner products.

These operating instructions must be read carefully by personnel whenever a product is brought into operation for the first time. They must always be readily available during operation.

The operating instructions form the basis for the safe handling of HASCO hot runner technology. The instructions and information given here, and particularly the safety regulations, must be followed under all circumstances.

The general safety regulations and accident prevention regulations at the location in question must always also be observed by personnel.

The operating instructions contain illustrations which serve for a better understanding only. In addition, the scope of delivery for customized versions or the latest technical changes can lead to deviations from the actual version supplied.

With this edition, all previous versions lose their validity.

Read carefully prior to use
and keep for future reference.

HASCO®
hot runner

EN 02/22 HK

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1 Important information

In this chapter, you will find information and explanations concerning these operating instructions, together with generally applicable regulations and definitions that are referred to in this manual.

1.1 Definition of terms

A hot runner is an assembly of several heated components installed in a mould for injection moulding. It is used to transport molten plastic from the injection unit into the cavities.

A hot runner nozzle forms part of this assembly, which is located between the hot runner manifold and the cavity. If a nozzle is used without a hot runner so that the machine unit is connected directly to the nozzle, this nozzle is designated a “mono nozzle”.

1.2 Restrictions on use

These operating instructions have been compiled in compliance with currently valid standards and regulations.

HASCO accepts no liability for damage or injuries caused as a result of the following:

- Disregard of these instructions
- Use of the hot runner technology in locations other than those in which it is intended to be used (cf. Chapter 2.4)
- Deployment of untrained personnel (cf. Chapter 2.3.1)
- Technical changes made to the products by the customer
- Use of spare parts not supplied by HASCO
- Improper maintenance (see Chapter 8)

Our verbal and written recommendations are non-binding and do not exempt you from testing the delivered products for their suitability for the intended purposes.

Use of the products is beyond our control and is therefore your sole responsibility.

The statutory regulations valid at the time of conclusion of the contract apply.

We reserve the right to make technical changes in the interest of improvement and further development.

1.3 Guarantee and guarantee conditions

The General Terms and Conditions apply. You can find them at the following internet address:

www.hasco.com/en/hasco/termsAndConditions

1.4 Spare parts

You will find spare parts in the current HASCO “Hot Runner Technology” catalogue which is available to download at https://www.hasco.com/en/hasco/mediathek.You can also consult Chapter 4 of these operating instructions if you are looking for the references of spare parts.

We will be pleased to assist you in person with the correct selection of our products. You can contact us as follows:

Tel.: +43 2236 202-500

Fax: +43 2236 202-12500

hotrunner@hasco.com

The delivery scope of a hot runner system includes a parts list showing all the parts that are included in your system upon delivery.

Please note that if non-suitable spare parts, or spare parts from third parties are used, this will void all liability on the part of HASCO.

1.5 Repairs and maintenance

Our service department is at your disposal for repair and maintenance work on HASCO hot runner products.

Tel.: +43 2236 202-500

Fax: +43 2236 202-12500

repair.hk@hasco.com

Modifications to products that are not performed by or expressly permitted by HASCO are not allowed. In the event of non-compliance, all liability on the part of HASCO shall lapse.

1.6 Customer service and experience reports

In the event of technical questions or a complaint, please contact:

HASCO Austria GmbH
Industriestrasse 21
A-2353 Guntramsdorf

Tel.: +43 2236 202-500

Fax: +43 2236 202-12500

hotrunner@hasco.com

You are also welcome to share your experience with our products with us – either using the aforementioned contact details or directly with your technical advisor. This will then be considered in our further developments in order to be able to supply you with the best possible product for your application.

For general inquiries and topics, you can also contact the following address:

HASCO Hasenclever GmbH + Co KG
Römerweg 4
D-58513 Lüdenscheid

Tel. +49 2351 957-0

Fax +49 2351 957-237

Also visit us at:

www.hasco.com

2 Safety provisions

HASCO hot runner products are intended for industrial use only. The products may only be operated, installed, dismantled and serviced by trained personnel.

In addition, systems designed by HASCO may only be used for applications that have been approved by HASCO and for which a HASCO specification sheet has been provided.

The accident prevention regulations and the statutory occupational safety obligations must be observed.

You are required to observe the safety notices in these operating instructions and to observe the instructions to avoid personal injury and damage to property.

The hot runner products must be checked for correct functioning at regular intervals by trained and instructed personnel.

In case of any irregularities impairing function or safety, the product must be taken out of service immediately. Before the product is brought into operation again, all irregularities that have arisen must be eliminated in their entirety.

If unauthorised changes are made to the HASCO hot runner equipment and its components, all guarantee claims will be forfeit.

The safety instructions are designed to protect the personnel. They also ensure safe and smooth operation.

Non-observance of these safety instructions can give rise to considerable hazards for both the personnel and the environment.

2.1 Safety to be assured by the system owner

The product supplied may only be used in the area for which it is intended.

In addition to these safety instructions, the valid safety, accident prevention and environmental regulations apply.

The system owner undertakes to only allow persons to work with the HASCO hot runner products who

- are familiar with the fundamental regulations governing occupational safety and accident prevention and who have been instructed in the handling of the products
- are wearing the appropriate protective clothing for the work in question, including face protection, eye protection and thermal protection gloves
- who have read, understood and confirmed with their signature Chapter 2: Safety provisions, together with the relevant safety and warning instructions for the work in question contained in these operating instructions (a corresponding form may be found in the Annex)
- are checked at regular intervals for safety-conscious work.

The system owner must also ensure that operators of the product are trained at regular intervals and informed about hazards.

The system owner is also responsible for ensuring that the products are always in perfect condition. To this end, the system owner must make sure that the specified maintenance intervals are observed.

The system owner is also obliged to provide the protective equipment specified for the work in question.

2.2 Symbols used

This chapter illustrates all the pictograms used in these operating instructions. You will also find an explanation of the symbols intended to raise the attention of the user.

2.2.1 Notice, warning and danger

You will find the following symbols throughout the operating instructions. These point to dangers or provide additional information to facilitate work with HASCO hot runner technology.

Notice: Here you will find useful information on the current topic, which will lead to a better understanding and problem-free handling. If these notices are ignored, it is possible that the operator will encounter irregularities.

Warning!: This symbol denotes a potentially dangerous situation that could possibly lead to reversible damage to people or machines. If this warning is not heeded, this can similarly result in disruptions or malfunctions.

Danger!: This symbol denotes an immediate danger. If this warning is not heeded, it could result in irreversible damage to people or machines.

2.2.1 Personal protective equipment (PPE)

To minimise health hazards, it is essential for personal protective equipment (PPE) to be worn. Please note the equipment that must be worn at all times when working with and on the HASCO hot runner equipment, and also the equipment required for special work. Each chapter of these operating instructions contains a list of both the possible dangers and the PPE that is to be worn. The pictograms used for this purpose are explained below.

The following personal protective equipment must be worn when carrying out any work:

Protective clothing

meaning tight-fitting clothing with a low tear strength

Safety shoes

for protection against heavy, falling parts and against slipping on slippery surfaces

Additional protective equipment is required for extraordinary jobs. The corresponding information on this is provided in the individual chapters of these operating instructions. This involves the following protective equipment:

Safety goggles

to protect the eyes against flying parts and splashes of liquid

Hearing protection

to protect the hearing from loud noises

Head protection

to protect against head injuries from suspended loads or falling parts

Protective gloves

to protect against abrasions, cuts and hot surfaces

Breathing protection

to protect against harmful dusts and gases

2.2.2 Hazard overview with the associated symbols

The following chapter sets out residual risks that can occur when using HASCO hot runner technology. This information will be included at a later point in these instructions and is intended to reduce health hazards and avoid dangerous situations.

Forklift trucks

When pallets are being transported, there is a danger due to moving forklift trucks.
Take care!

Suspended loads

It is strictly forbidden to remain under suspended loads.
Make sure that there are no people in the danger zone.
Failure to do so could result in serious damage to health.

Tripping hazard

Pallets standing around, an untidy work environment and structural obstacles give rise to a risk of tripping. This can cause serious damage to health. Take care!

Danger of crushing

Improper or careless handling could cause body parts to be crushed. This can result in serious damage to health.

Hand injuries

In the event of improper or careless handling, there is a danger of crushing and other hand injuries. This can result in serious damage to health.

Hydraulic or pneumatic energy

Needle valve systems are operated with hydraulic or pneumatic energy. Moving parts or improper use can cause damage to health. Depressurise the system prior to dismantling!

Work of this type may only be carried out by qualified personnel.

Dangerous electrical voltage

The heaters for the hot runner systems are heated with electric energy. There is thus a danger to life through electric voltage!

The corresponding work may only be carried out by a qualified electrician.

Hot surfaces

The surfaces of the hot runner systems can become very hot and cause serious damage to health in the form of burns.

Substances that are harmful to health

The operating materials used are to be rated as harmful to health unless clearly described otherwise. For more detailed information, refer to the hazard information for the substance in question.

2.3 Definition of safety terms

2.3.1 Definition of qualified personnel

In the course of these operating instructions, groups of persons are named who must be qualified for working on the hot runner equipment. These groups are defined in the sub-chapters that follow:

2.3.1.1 Qualified personnel

A qualified worker is one who has sufficient knowledge based on their technical training and experience, and who is familiar with the relevant regulations to such an extent that they can recognize possible dangers and take the necessary measures to eliminate them.

2.3.1.2 Qualified electrician

Based on their technical training and experience, qualified electricians are familiar with the relevant standards and regulations and can recognize possible dangers and take the necessary measures to eliminate them.

2.3.1.3 Instructed person

The instructed person is informed by the operator of the tasks that have been assigned to them and is instructed on the associated dangers that arise in the event of failure to observe the safety information. The fact that instruction has been given must be documented.

2.3.1.4 Unauthorised persons

Only persons who can be expected to perform their work reliably are permitted as personnel. Non-qualified persons and in particular, persons whose abilities to react are influenced (such as by drugs, alcohol or medicines) are not permitted to carry out any work. Serious injuries and death, as well as serious damage to property, can result.

2.4 Intended area of use

The intended use of HASCO hot runner technology is the injection moulding of plastic parts inside a mould.

Any use other than this is deemed to be misuse and can lead to dangerous situations. These, in turn, can result in serious personal injury and damage to property.

Claims of any kind for damage due to use of the products for other than the intended purpose are excluded.

HASCO hot runner technology may only be employed and stored in a clean, dry and non-corrosive environment. It may only be used in closed rooms.

HASCO hot runner technology may not be used in an explosion hazard area.

If HASCO hot runner technology is used for an application that HASCO has not designed it for, HASCO will not assume any liability for the correct functioning of the system. HASCO hot runners are specifically designed for the application quoted in the specification sheet, which is sent with every hot runner system.

2.5 Safety devices

Since the HASCO hot runner technology is designed for use in the vicinity of an injection moulding machine, it has no safety devices of its own.

2.5.1 Protection against switching on again

If work is to be conducted on the HASCO hot runner equipment, this may only be done after the power supply and the hydraulics and pneumatics have been physically disconnected. The exception to this is work that requires an active supply of energy, such as nozzle heating or similar. Once work of this type has been completed, the energy supply must be disconnected again before continuing. The system must also be secured against switching on again. This can be done by means of a lock on the main switch. At all events, a warning sign must be affixed to prevent other people from switching on the electricity supply to the system again.

Once the work has been completed and all the protective devices set up, the warning sign can be removed.

2.6 Response in the event of dangers and accidents

A first aid course is recommended for everyone. This chapter cannot replace a first aid course and only provides a brief overview of the most important points.

All employees should be informed about the following points at all times:

- Who is a first-aid responder?
- Where is equipment such as fire extinguishers, first aid kits, defibrillators, etc.?
- Where is the nearest telephone for making an emergency call and what are the emergency numbers to be dialled?
- How do I behave when making an emergency call? (Keyword “5 questions” – where, what, how many people, what injury, who is calling and only hang up after the emergency service has hung up)
- Who is to be notified?

Note the rescue chain:

In the event of an accident, proceed as follows:

- Identify and assess the danger to yourself and others. Protecting yourself is always more important than rescuing others.
- Secure the scene of the accident: switch off machines in the danger zone / activate the emergency stop
- Initiate immediate measures (stop heavy bleeding, shout out to attract attention to yourself, check vital functions, etc.)
- Get help and warn people who are still in the danger zone
- Rescue the people concerned and perform first aid.

Please note: you are obliged to provide help where this can reasonably be expected of you. If you are unsure of what to do, get help at all events!

2.7 Environmental protection

Observe the safety data sheets when handling all operating materials. If dangerous substances such as lubricants are released into the environment, this can cause considerable damage.

Pay attention to proper disposal. Information on this can similarly be found in the relevant safety data sheets.

3 Technical data

The following chapter contains technical information on HASCO hot runner technology.

3.1 Operating temperatures

You will find the maximum permitted operating temperature for HASCO hot runner equipment in the following table:

Table 1: Operating temperatures

Component	Max. permitted operating temperature
Hot runner systems	400°C
Nozzles	Type-dependent[1]
Hydraulic needle valves	120°C
Pneumatic needle valves	150°C

To prevent degradation of the plastic in the melt channel, the maximum processing temperature specified on the data sheet for the plastic must not be exceeded. The temperature must be reduced during stoppages. In the case of hot runner systems, the difference between the melt temperature and the mould temperature specified on the customer drawing must be observed.

3.2 Voltages

The heating elements fitted in HASCO hot runner systems and the nozzle heaters are all operated with a voltage of 230V.

The connections to the energy supply are tailored to individual customer wishes by HASCO and thus vary.

3.3 Thermocouples

All the thermocouples used for HASCO hot runners are Fe-CuNi, Type J.

The connections of the thermocouples are tailored to individual customer wishes by HASCO and thus vary.

[1] For more precise information, please consult the installation instructions for the nozzle type in question or contact our Application Technology department.

3.4 Operating pressures

The maximum permitted injection pressure for HASCO hot runner systems is 2000 bar.

Please note which nozzle types are fitted. In some cases, only a lower injection pressure is permitted. You should refer to the relevant installation instructions for the different nozzle types.

Nozzles up to and including size 25 may be operated with an injection pressure of 1500 bar maximum. Vario Shot, Techni Shot and Single Shot above size 25 are suitable for an injection pressure of 2000 bar maximum. Regarding the Value Shot, a maximum pressure of 1800 bar is to be met.

Please note which type of needle valve has been fitted in your system!

The following pressures are permitted for operation of the needle valve cylinder:

max. permitted hydraulic operating pressure – 50 bar
max. permitted pneumatic operating pressure – 8 bar

Take care not to select too low an operating pressure. This can result in the nozzles not being able to open or shut.

If it is attempted to inject plastic through a closed nozzle, this can damage the hot runner system.

The hydraulic and cooling connections are tailored to individual customer wishes by HASCO and thus vary.

The maximum pressure for the cooling system is 25 bar.

3.5 Prescribed tightening torques

3.5.1 Nozzle melt chambers and nozzle sleeve nuts

Please note the specified torque on the corresponding drawing for the hot runner system (cf. system number). Different tightening torques are necessary for installation and removal as a function of the nozzle type, nozzle size and gate type.

If you do not have a design drawing at your disposal, the respective tightening torques can be found in our current catalogue in the chapter for the relevant nozzle, or in the special operating instructions for the system in question.

3.5.2 Other tightening torques

Needle guide sleeves are always tightened to 35 Nm. One exception to this is the H107930/2x7x20. This is tightened to 25 Nm.

You will find the tightening torques for bolts and machine screws on hot halves in Table 4 on Page 35.

The torque for installing the sprue bushings is set out in Table 2.

Table 2: Sprue bushings: mounting torques

Thread on the sprue bushing	Tightening torque
M16x1.5	75 Nm
M24x1.5	200 Nm
M30x1.5	300 Nm
M34x1.5	350 Nm

3.6 Lubricants

HASCO Z260 heavy-duty lubricant is used for the running surfaces of all HASCO needle valves.

3.7 Name plates

For all our products listed below, HASCO hot runner technology will supply you with a name plate. This unambiguously identifies your product. Keep it with your mould so your product can be clearly identified.

3.7.1 Nozzles

Figure 1: Nozzle name plate

Each nozzle delivery contains a name plate as shown in Figure 1. It contains information on the nozzle reference, the internal HASCO order number that you will also find on your order confirmation, the thermocouple type and the rated power and supply voltage.

The full nozzle reference, with the internal HASCO order number, is marked on each nozzle. The following illustrations show the location of the lettering. The nozzle reference is marked exclusively at the points shown. It is a laser inscription on the nozzle and is not to be confused with other references like the heater, which is normally also visible.

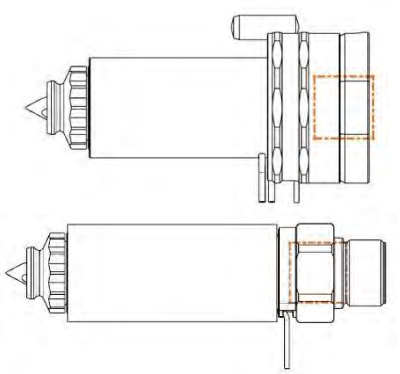

Figure 2: Reference on the Vario Shot

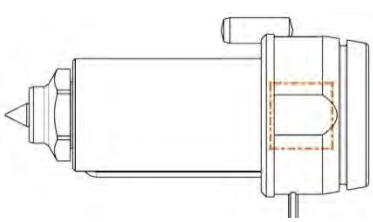

Figure 3: Reference on the Techni Shot

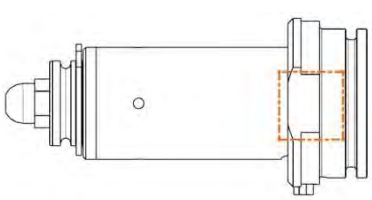

Figure 4: Reference on the Value Shot

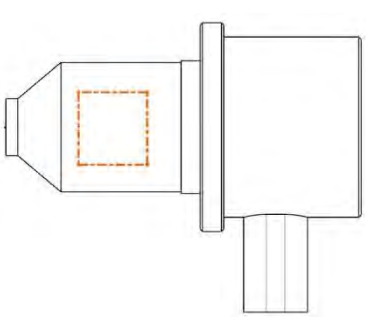

Figure 5: Reference on the Standard Shot

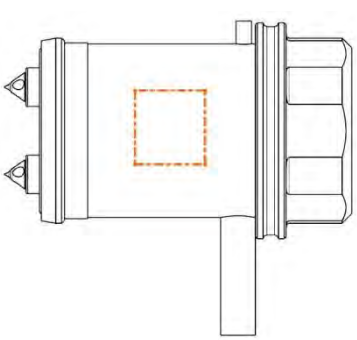

Figure 6: Reference on the Multi Shot

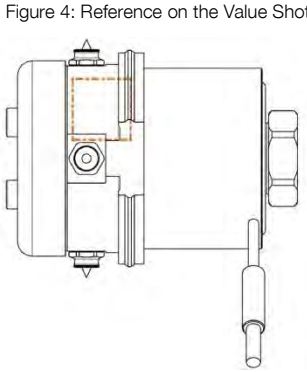

Figure 7: Reference on the Multi Shot with side gating

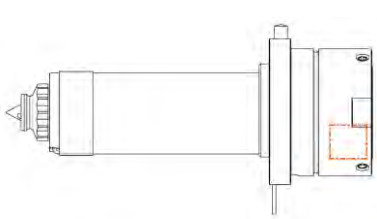

Figure 8: Reference on the Sigle Shot

3.7.2 Hot runners

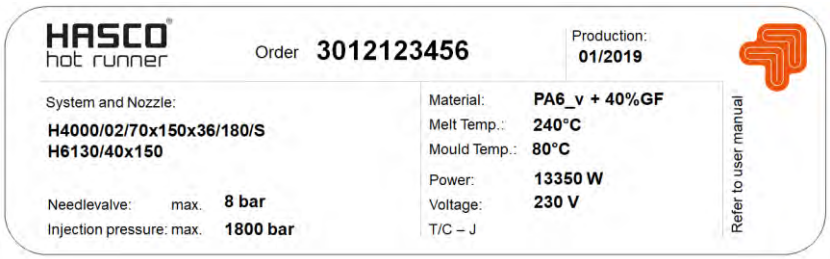

Figure 9: Hot runner name plate

Figure 9 shows a name plate of the type supplied with each hot runner. This contains details of the internal HASCO order number, which permits clear identification of the hot runner, the production month, the reference of the hot runner and the fitted nozzles. Below, the total rated power, the supply voltage and the fitted thermocouple type on the left side, together with the material and details of the processing temperatures for which the system has been designed, are shown.

In addition to the name plate, each HASCO hot runner block has the logo, the reference number and the system number lasered on its side.

3.7.3 Wired systems and hot halves

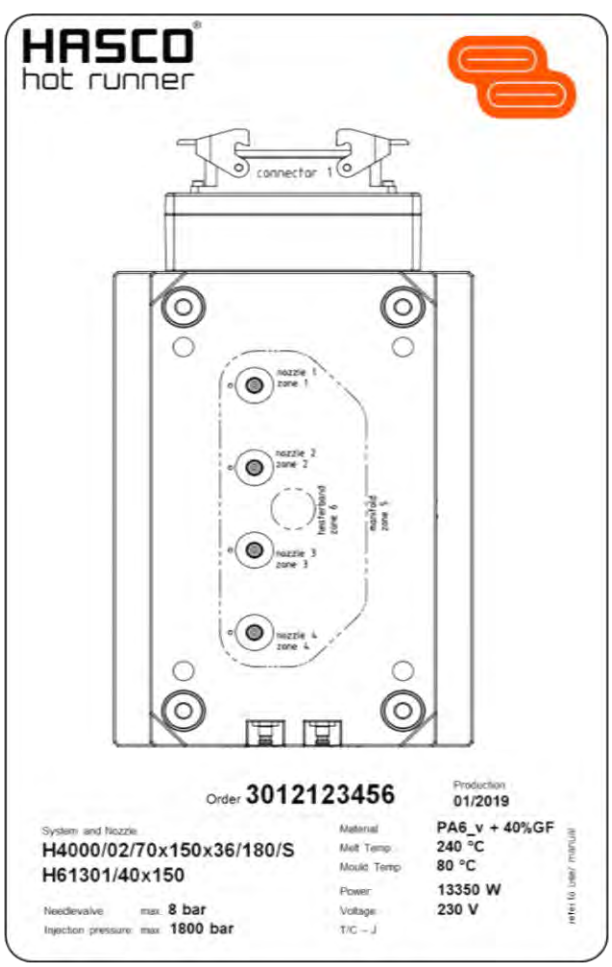

Figure 10: Name plate for a hot half

The name plates on wired systems and hot halves not only contain the details mentioned so far but also a frontal diagram of the system looking toward the nozzles, including the reference of the heating circuit and the corresponding zone on the junction box.

4 Structure of a hot runner system

This chapter shows the structure of the HASCO hot halves and the hot runner systems, as well as the different nozzle types. Here you will also find the references of the individual components if you need these for ordering parts later on. The illustrations are schematic diagrams and the actual design may deviate from the illustrations.

In order to avoid damage and prevent malfunctions, all modifications to nozzles or other components must first be discussed with the HASCO hot runner application technology department.

4.1 Hot runner nozzle and mono nozzle

4.1.1 Vario Shot (H61xx, H62xx, H65xx)

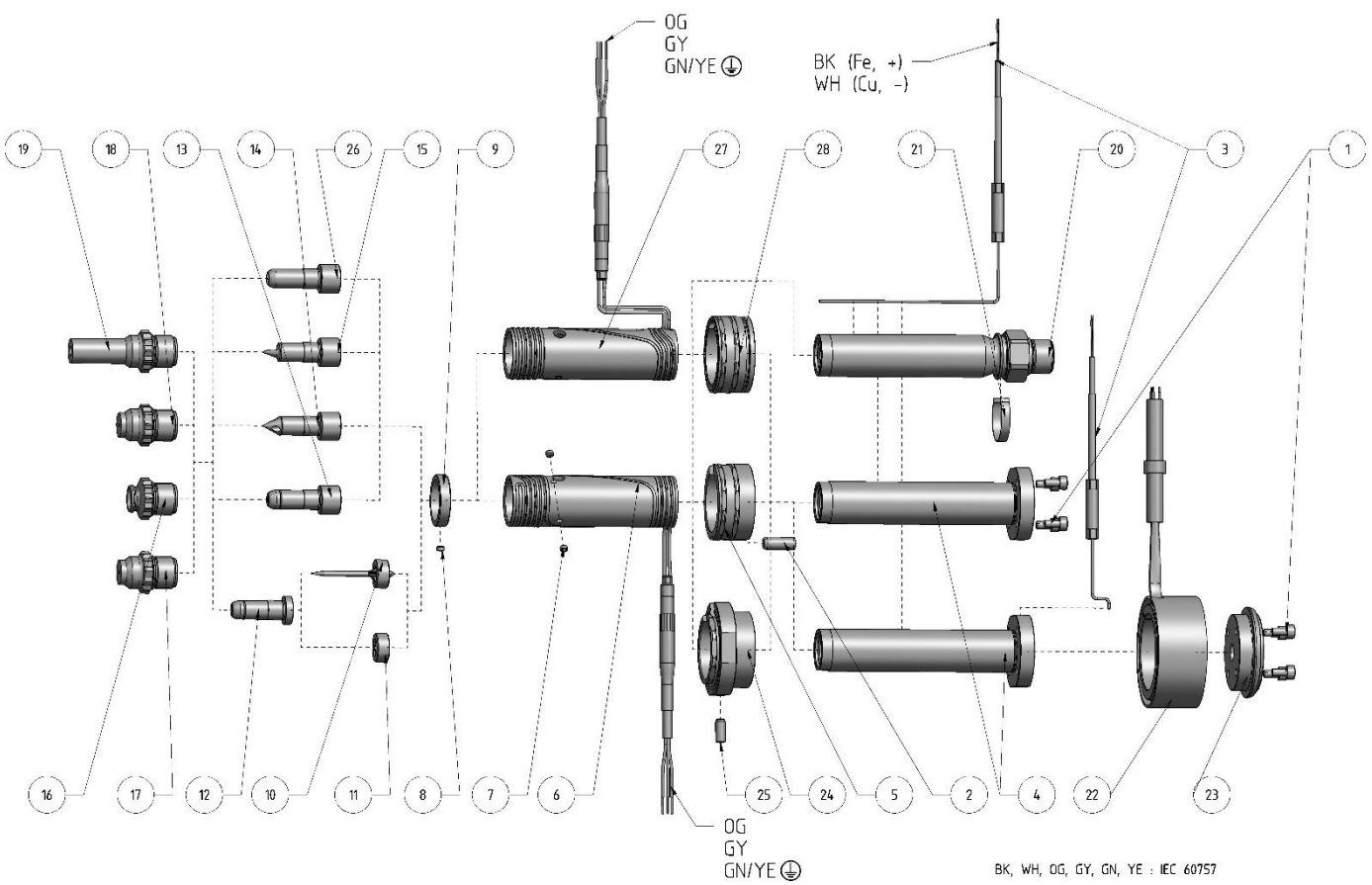

Figure 11: Individual parts - Vario Shot

1	Socket head cap screw	Z31
2	Dowel pin	Z25
3	Thermocouple	H1295/6
4	Nozzle body, Part 1	H6001
5	Nozzle body, Part 2	H6101
6	Heater	H6002
7	Set screw	
8	Set screw	
9	Sensor retaining ring	H6003
10	Torpedo tip, 4-hole	H6020
11	Needle guide disc	H6055
12	Sleeve	H6050
13	Torpedo tip, open	H6040
14	Torpedo tip, 3-hole	H6030
15	Torpedo tip, 1-hole	H6010
16	Sleeve nut	H6060
17	Melt chamber, short, needle valve	H6080
18	Melt chamber, short	H6070
19	Melt chamber, long	H6090
20	Nozzle body, screw-on	H6501
21	Thermocouple clip	H6503
22	Head heater	H6203
23	Adaptor disc	H6204
24	Nozzle body, Part 2	H6201
25	Dowel pin	Z25
26	Torpedo tip, open, needle valve	H60406
27	Heater, front mounted	H60021
28	Nozzle Body, Part 2, front mounted	H61011

4.1.2 Single Shot (H63xx)

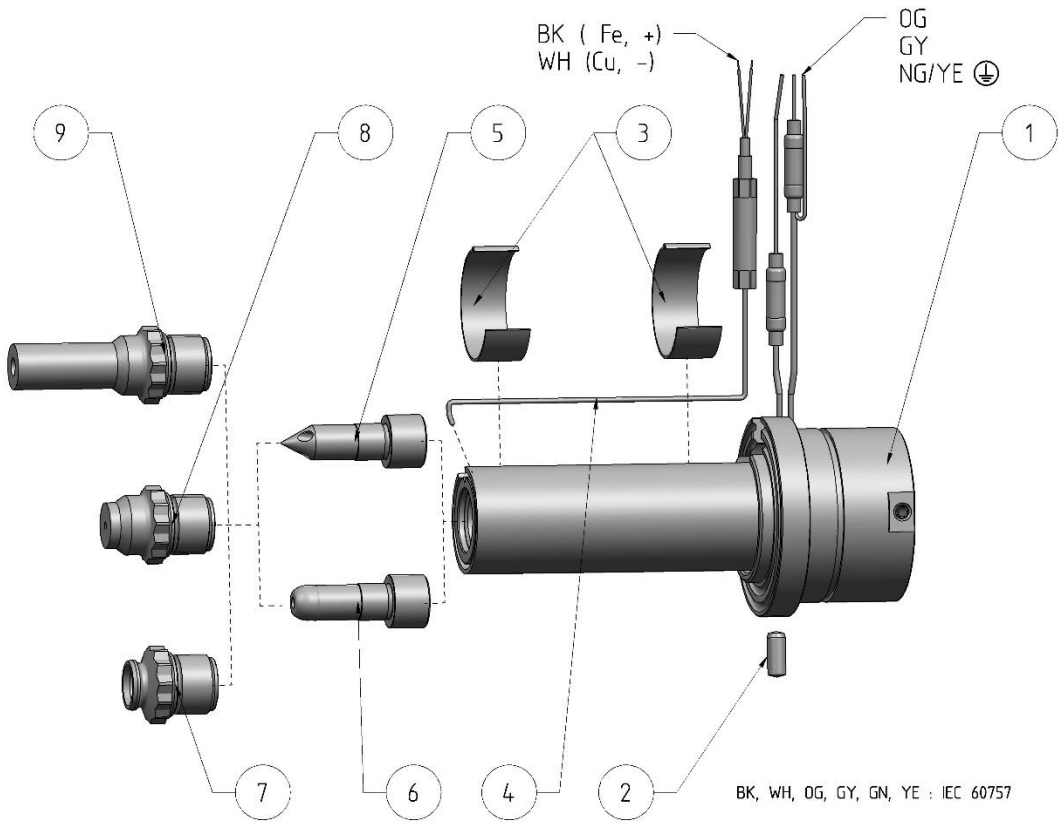

Figure 12: Individual parts – Single Shot

1	Subassembly nozzle body	H6306
2	Dowel pin	Z25
3	Thermocouple-clip	H6304
4	Thermocouple	H1295/6
5	Torpedo tip	H6030
6	Torpedo,open	H6040
7	Sleeve nut	H6060
8	Pre chamber, short	H6070
9	Pre chamber, long	H6090

4.1.3 Techni Shot (H33xx, H34xx)

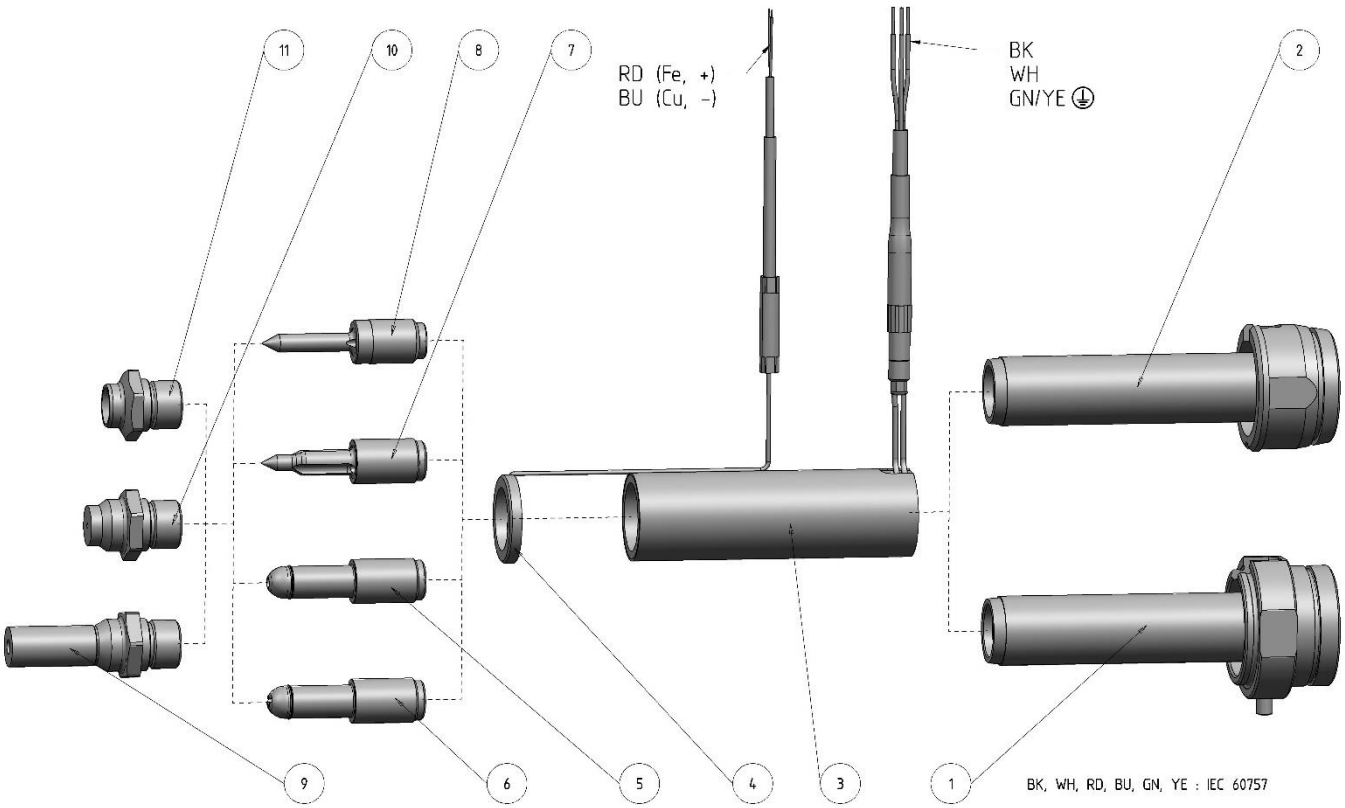

Figure 13: Individual parts - Techni Shot

1	Nozzle body / Manifold application	H33001, H33000	7	Torpedo, Tip, TZM	H33215
2	Nozzle body / Mono nozzle application	H34001, H34000	8	Torpedo, tip, CuCoBe	H33211
3	Heater	H33061 / H33062	9	Melt chamber, long	H33225, H33226 (size 32 and 60), H33425 (for Pos. 5)
4	Thermocouple	H3305			
5	Torpedo, open	H33411 (copper), H33415 (TZM)	10	Melt chamber. short	H33220, H33221(size 32 and 60), H33420 (for needle valve) H33421(for Pos. 5), H33422(counter-cone)
6	Torpedo, open, needle	H33416			
			11	Sleeve nut	H33217, H33218 (size 25,32,60), H33417 (for Pos. 5)

In the case of the Techni Shot size 20 and 25, the design and component references may differ at times. Please consult our Hot Runner Application Technology department on this.

4.1.4 Value Shot (H202xx)

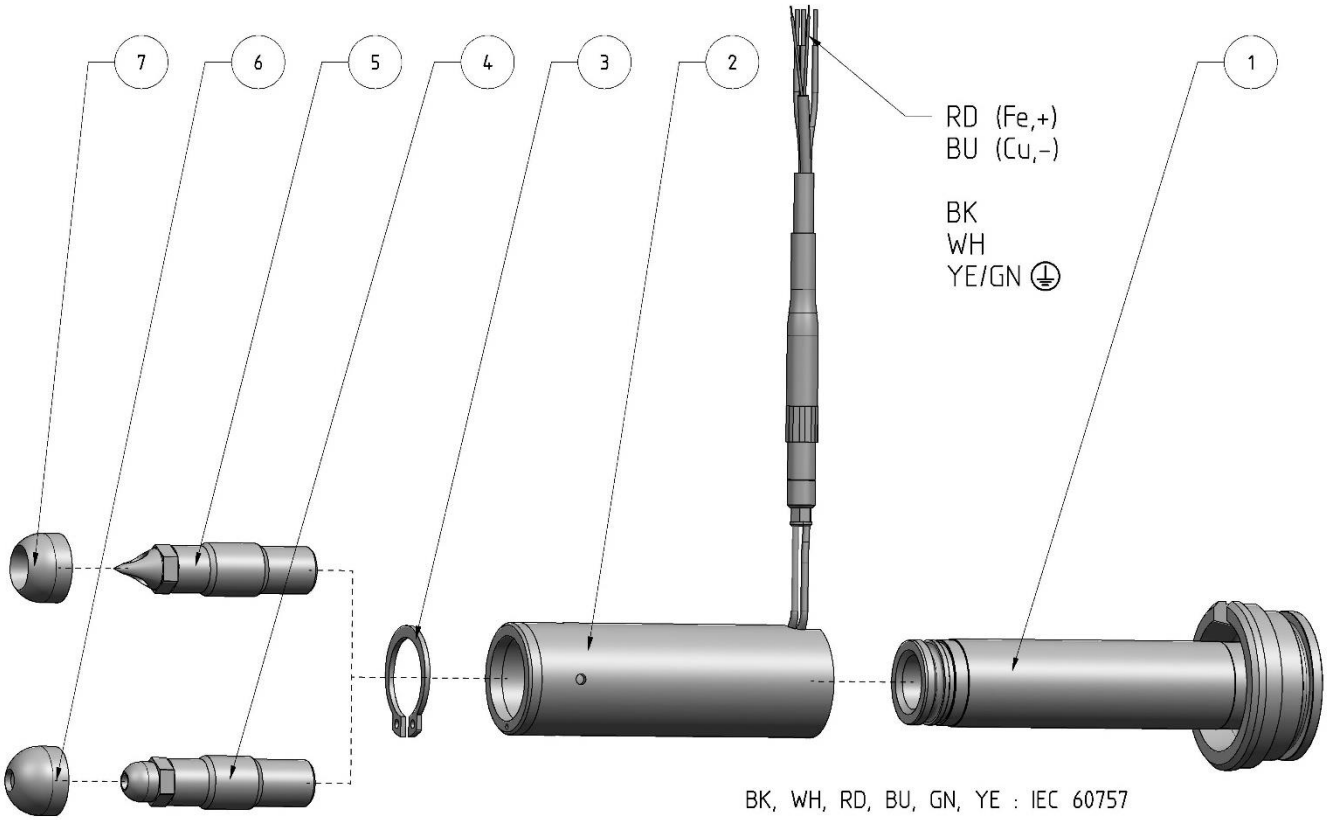

Figure 14: Individual parts - Value Shot

1	Nozzle body	H2021
2	Heater	H2026
3	External circlip	Z67
4	Torpedo, open	H2012, H2014
5	Torpedo, tip	H2013, H2015
6	Reduction cap	H2036
7	Reduction cap	H2035

4.1.5 Multishot (H10325, H10425)

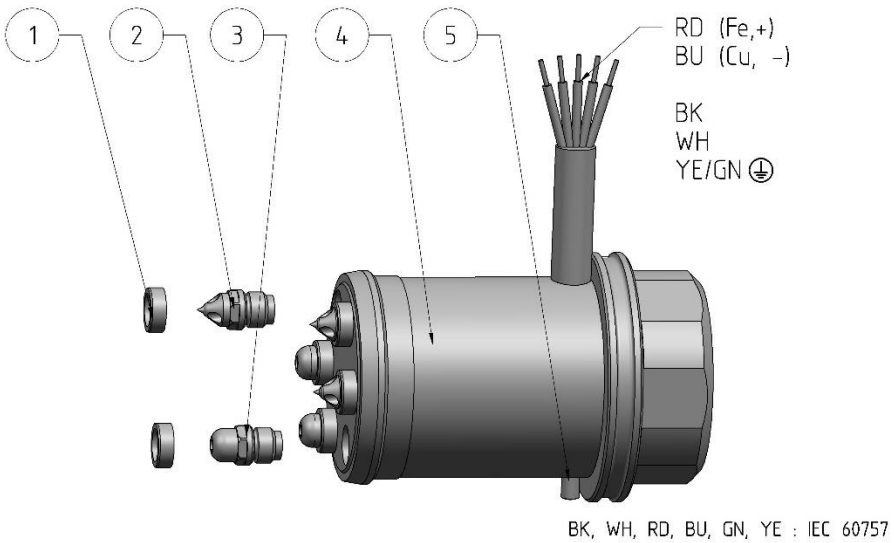

Figure 15: Individual parts - Multi Shot

1	Sealing cap	H10325/XX-04	4	Nozzle body	
2	Nozzle tip, 3-hole	H10426/7.6	5	Dowel pin	Z25/4x20
3	Nozzle tip, open	H10326/7.6			

4.1.6 Multishot side gating (H10440)

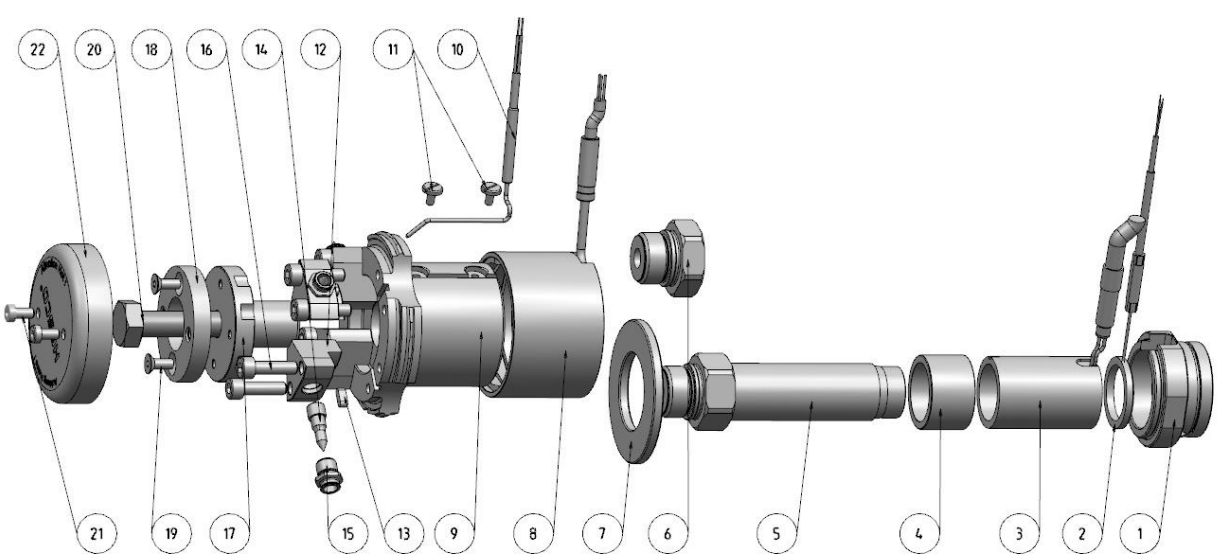

Figure 16: Individual parts - Multi Shot, side gating

1	Nozzle head	H1044010/75/B	11	Flat head screw	H104400/3x6-10/E
2	Thermocouple	H104401/75-04/E	12	Segment	H104400/75-03/E
3	Heater	H33061/40xl1/E	13	Feather key	DIN 6885-1 3x3x8
4	Spacer sleeve	H104401/29x23xl5-05/B	14	Torpedo tip / CuCoBe	H104413/75/E
5	Nozzle body / Mono nozzle application	H104401/75xl1-01/B	15	Sleeve nut	H104420/ 75/E
6	Nozzle body / Manifold application	H104402/75xl1/B	16	Screw	H104400/5x18-11/E
7	Titanium ring	H104401/56x4/75-06/B	17a	Clamp-on cover 2x and 4x	H104400/ 75x4-02/B
8a	Heater / Single application	H104400/1/48x37-05/E	17b	Clamp-on cover 6x	H104400/ 75x6-02/B
8b	Heater / Manifold application	H104400/2/48x37-05/E	18	Insulating disc	H104400/ 45x7-06
9a	Basic body 2x	H104400/75x2-01/B	19	Head screw	Z33/4x12
9b	Basic body 4x	H104400/75x4-01/B	20	Hexagon screw	H104400/10x40-08/B
9c	Basic body 6x	H104400/75x6-01/B	21	Screw	H104400/4x6-12/E
10	Thermocouple	H104400/1,5x71-09/E	22	Protective cover	H104400/60x15-07/B

4.2 Multimodule (H417x)

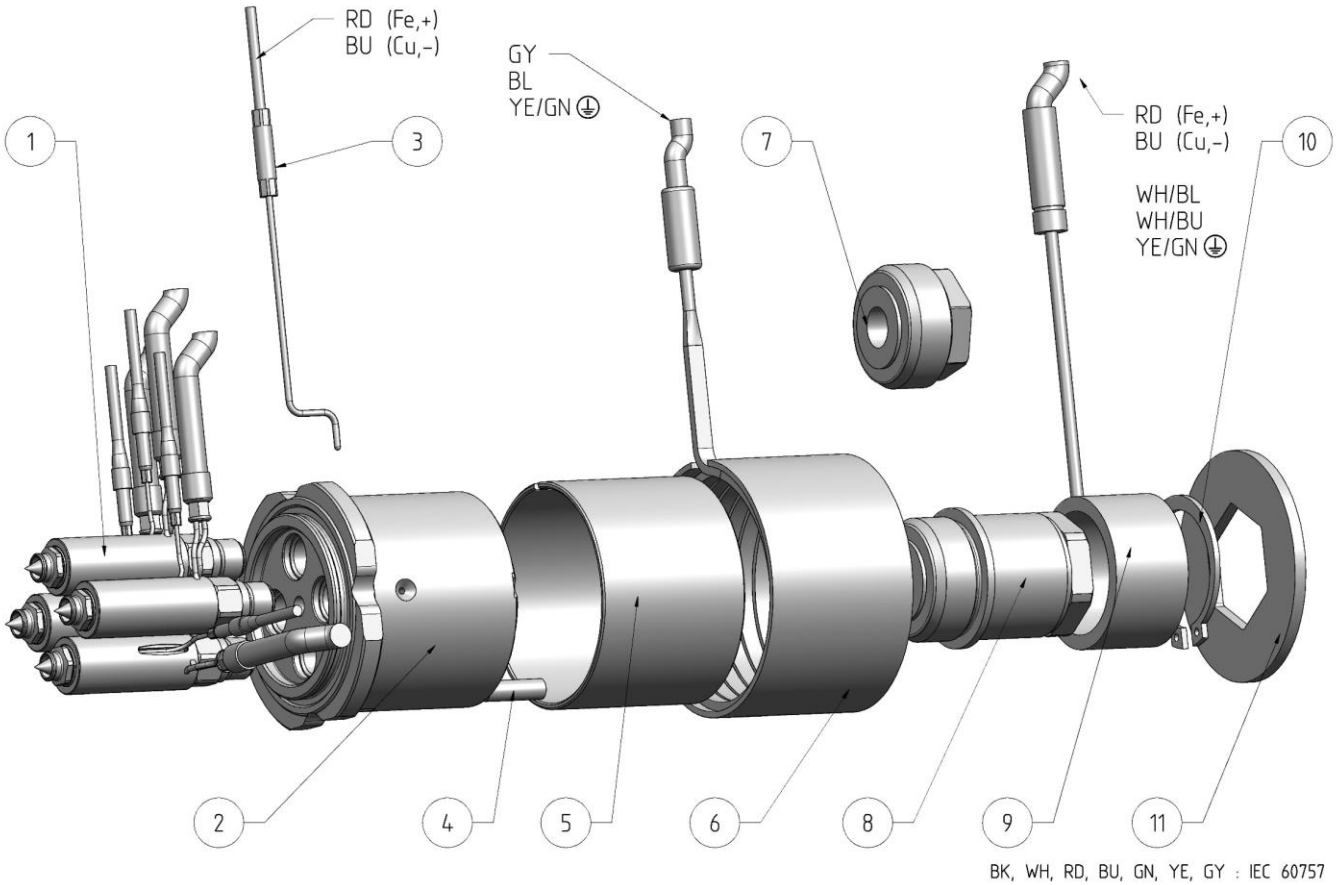

Figure 17: Individual parts - Multimodule

1	Nozzles	H3320X/20xXX/SC	7	Sprue bushing, hot runner application	H32801/30x19-02/B
2	Basic body	H32801	8	Sprue bushing, single application	H1055/5/30x45x10
3	Thermocouple	H1295/5/1.5x71	9	Heater band, single application	H1134/30x20x300
4	Dowel pin	Z25/5x18	10	Circlip, single application	Z67/30x1.5
5	Sleeve	H32801	11	Sealing disc, single application	H1058/56x27
6	Heater + Jacket	H3282			

4.3 Single needle valve pneumatic (H2010)

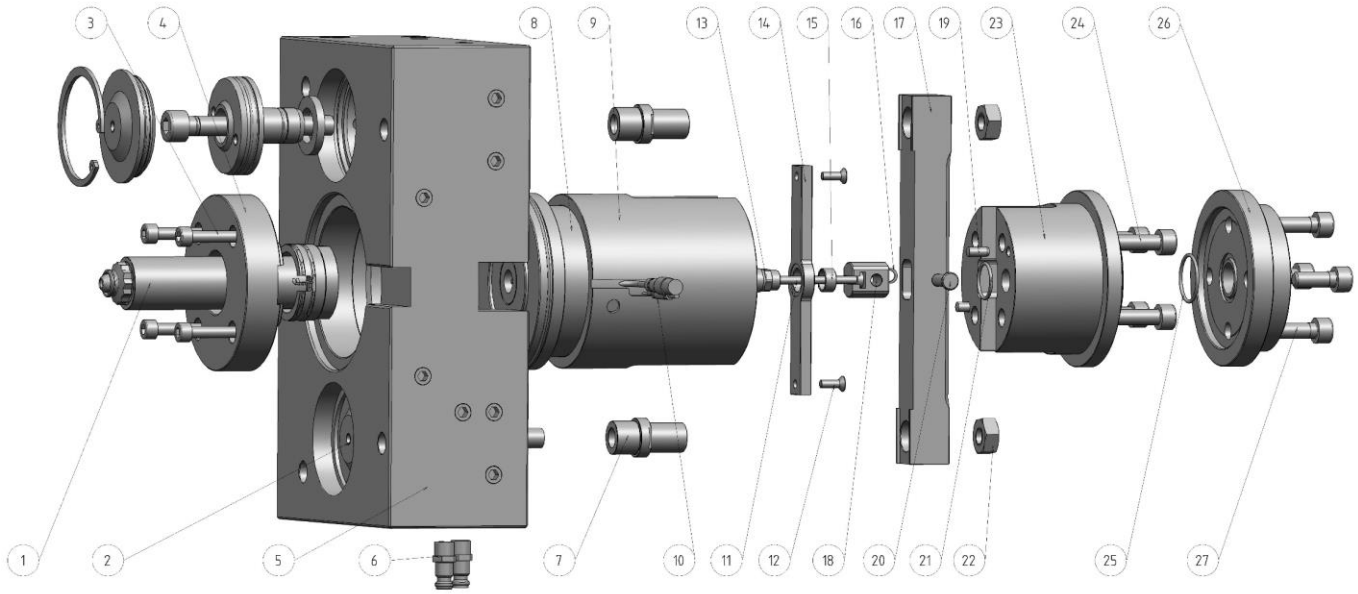

Figure 18: Individual parts - single needle valve H2010/12

		H2010/6	*H2010/12*
1	Nozzle		
2	Piston	H2371/18x50x8	H2371/18x50x12
2a	Piston-screw	H2010/6x10x65-13	H2000/10x60
3	Socket head cap screw	Z31/6x30	Z31/6x40
4	Retainer ring	H2000/6x70xXX	H2000/12x90xXX
5	Piston plate	H2010/6x150x246x66	H2010/12x246x160x76
6	Connecting nipple	Z81/9xG1/8	Z81/9/10x1
7	Sleeve	H2010/6x14x10,1x12-11	H2000/17x18,5
8	Valve body, Pt. 2	H2000/6x63x41-02	H2000/12/71x60-02
9	Heater	H2000/6x54x63	H2000/71x102+H2000/83x102 (Hüllrohr)
10	Thermocouple	H1295/5/1x45	H1295/5/1x65
11	Needle	H1004/XX	H1004/XX
12	Head screw	Z33/4x12	Z33/4x12
13	Needle guide sleeve	H107930/XX	H107930/XX
14	Cooling bar	H2000/6x99x17x4-08	H2000/12x117x23x6-08
15	Spacer	n/a	H2000/12x12x10x6-12
16	Circlip	DIN 471/5/FormA	DIN 471/6/FormA
17	Bridge	H2000/6x174x14x16-03	H2000/188x20x20
18	Needle holder	H2000/6x12x14xXX	H2000/12x18x20xXX
19	Dowel pin	Z25/4x12	Z25/5x12
20	Pin	H2000/ 6x14x5-10	H2000/12x20x6-10
21	O-ring	H1015/16.3x1.6	H1015/22,2x1,6
22	Hexagon nut	Z28/10	Z28/10
23	Valve body, Pt. 1	H2000/ 6x68x48-01	H2000//12/71x58-01
24	Socket head cap screw	Z31/6x50	Z31/8x60
25	O-ring	H1015/11x1.6	H1015/16,3x1,6
26	Cover	H2000/ 6x63x16-09	H2000/12x90x24-09
27	Socket head cap screw	Z31/5x14	Z31/8x22

4.4 Single needle valve hydraulic (H2020)

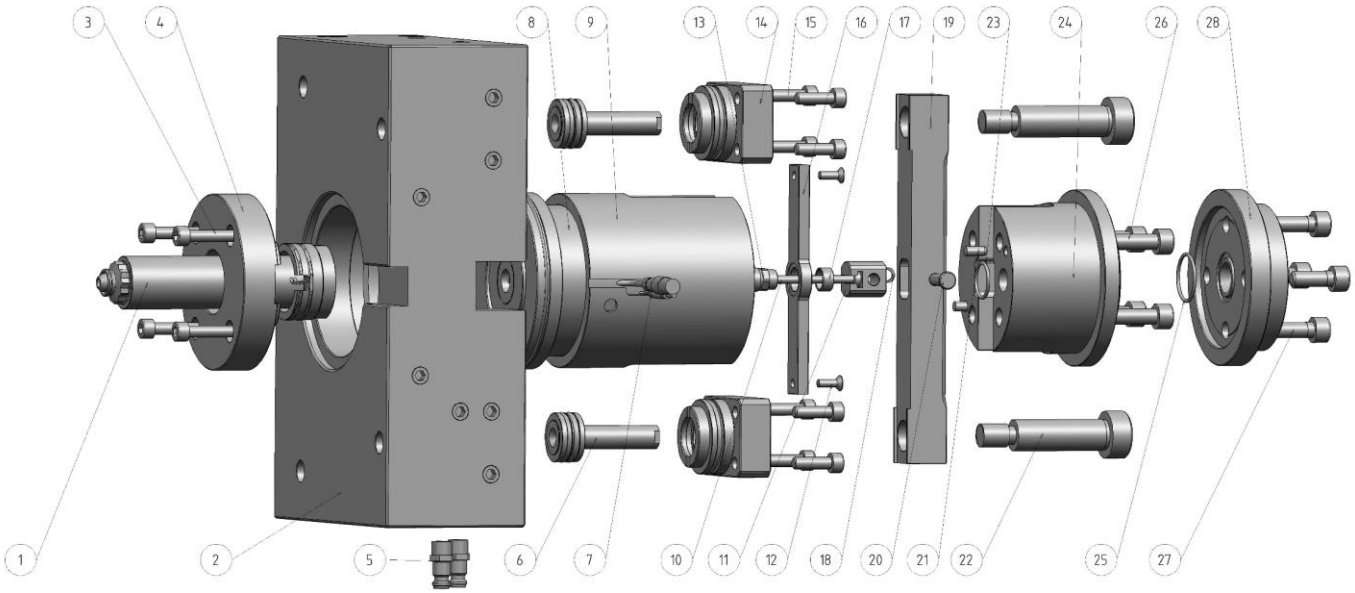

Figure 19: Individual parts - single needle valve H2010/12

		H2020/6	*H2020/12*
1	Nozzle		
2	Piston plate	H2010/6x246x150x 66	H2020/12/160x246x76
3	Socket head cap screw	Z31/6x30	Z31/6x40
4	Retainer ring	H2000/6x70xXX	H2000/12x90xXX
5	Connecting nipple	Z81/9/10x1	Z81/9/10x1
6	Hydraulic piston	H10715/63x7x25-01/B	H10715/90x17x32-01/B
7	Thermocouple	H1295/5/1x45	H1295/5/1x65
8	Valve body, Part 2	H2000/6x63x41-02	H2000/12/71x60-02
9	Heater	H2000/6x54x63	H2000/71x102+H2000/83x102 (Hüllrohr)
10	Needle	H1004/XX	H1004/XX
11	Needle holder	H2000/6x12x14xXX	H2000/12x18x20xXX
12	Head screw	Z33/4x12	Z33/4x12
13	Needle guide sleeve	H107930/XX	H107930/XX
14	Hydraulic piston cover	H10715/63x7x25-02/B	H10715/90x17x32-02/B
15	Socket head cap screw	Z31/6x20	Z31/6x20
16	Cooling bar	H2000/6x99x17x4-08	H2000/12x117x23x6-08
17	Spacer	n/a	H2000/12x12x10x6-12
18	Circlip	DIN 471/5/FormA	DIN 471/6/FormA
19	Bridge	H2000/6x174x14x16-03	H2000/188x20x20/hyd
20	Pin	H2000/6x14x5-10	H2000/12x20x6-10
21	Dowel pin	Z25/4x12	Z25/5x12
22	Fitting screw	H2020/6x10x14-06	Z31/12x30
23	O-ring	H1015/16.3x1.6	H1015/22,2x1,6
24	Valve body, Part 1	H2000/6x68x48-01	H2000//12/71x58-01
25	O-ring	H1015/11x1.6	H1015/16,3x1,6
26	Socket head cap screw	Z31/6x50	Z31/8x60
27	Socket head cap screw	Z31/5x14	Z31/8x22
28	Cover	H2000/6x63x16-09	H2000/12x90x24-09

4.5 Hot runner manifold block (H4000, H4010) and Streamrunner (H4070, H4075)

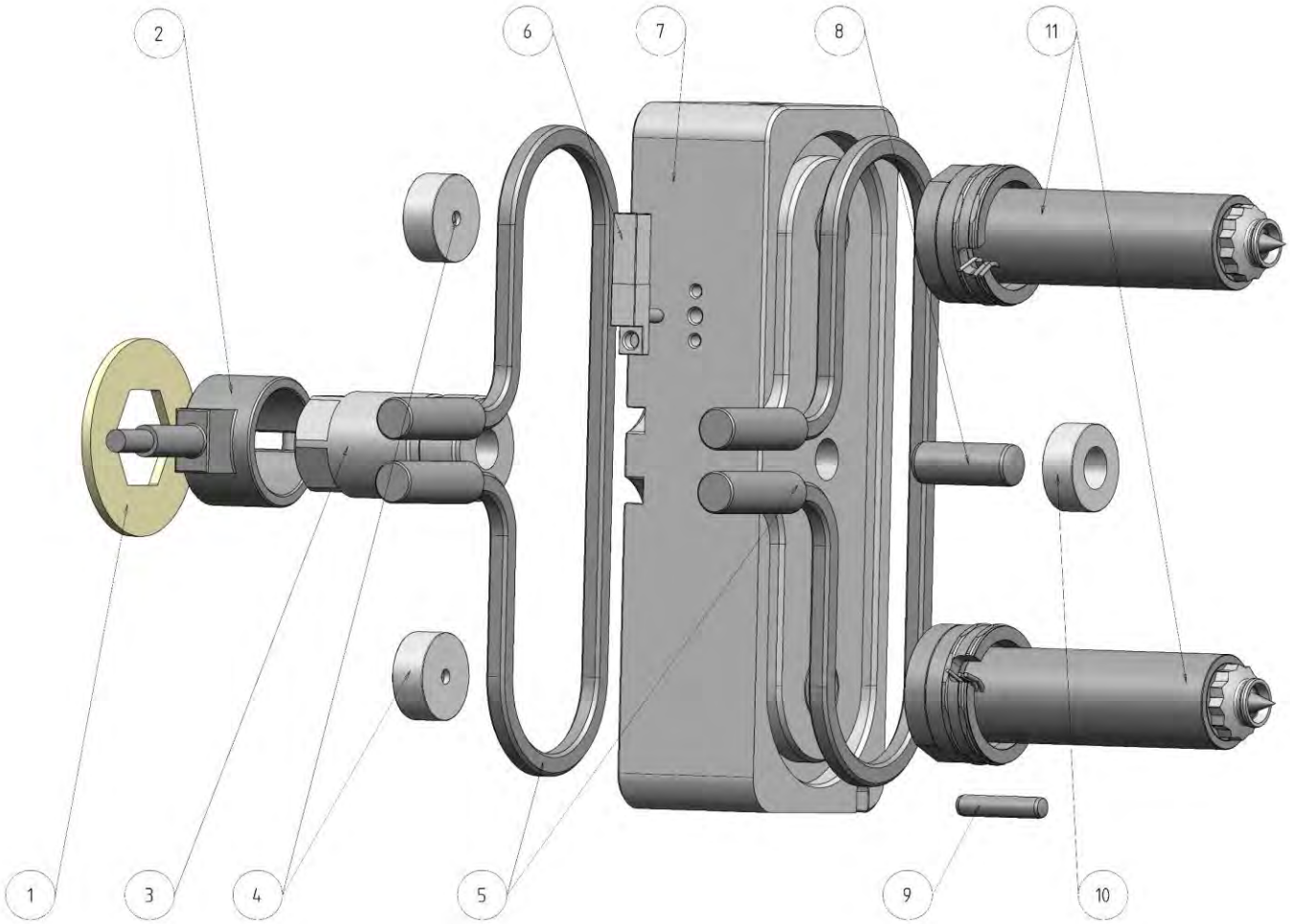

Figure 20: Individual parts - hot runner manifold

1	Sealing disc	H1057 or H1058	7	Manifold block	H4000 or H4010
2	Heater band	H1134	8	Dowel pin	Z26
3	Sprue bushing	H1055	9	Dowel pin	Z26
4	Spacer disc	H1052/3	10	Spacer disc	H1052/4
5	Tubular heating element	H11381	11	Nozzle	
6	Thermocouple	H1295/1			

4.6 Wired system (H4015 & H4016)

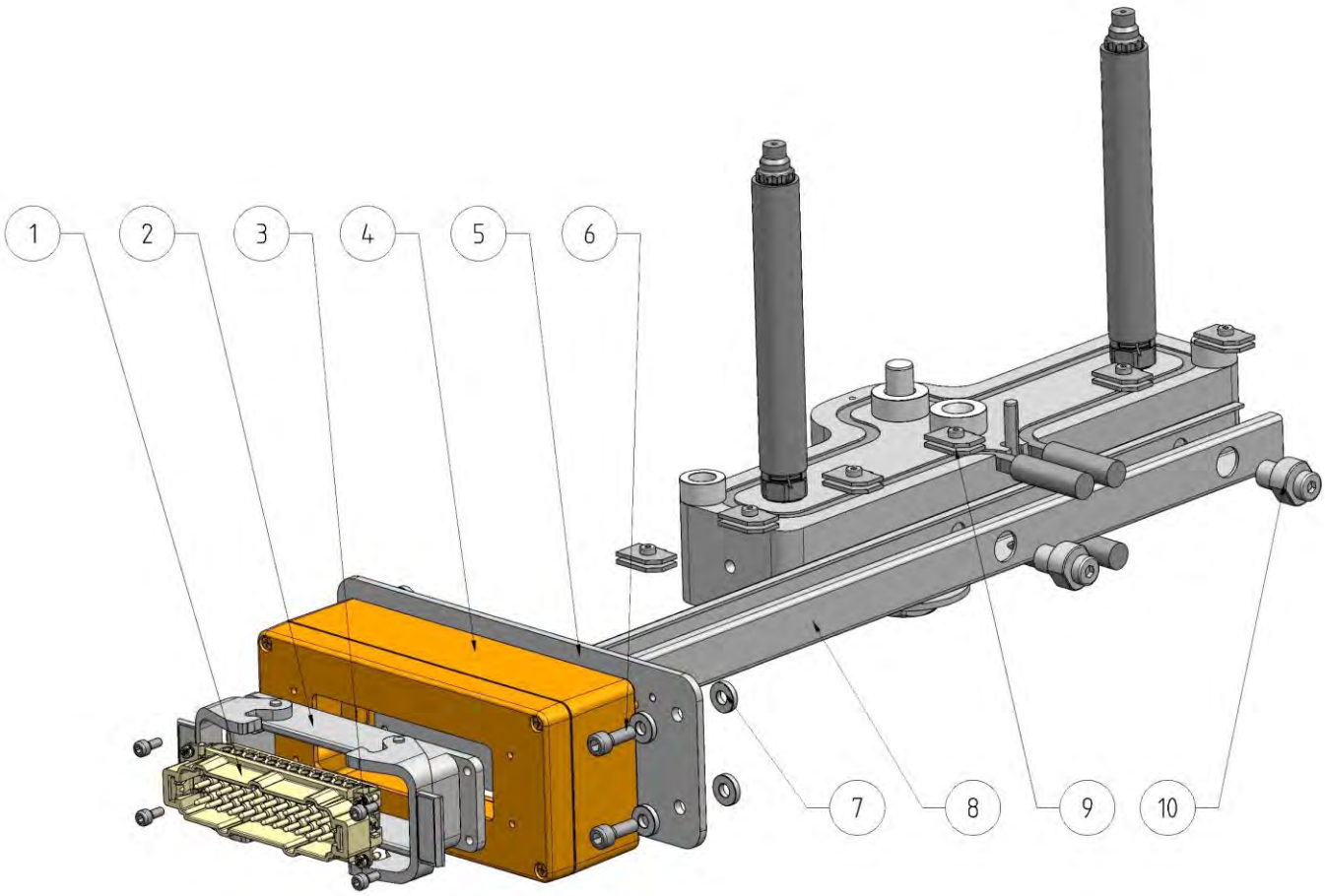

Figure 21: Individual parts - wired system

1	Plug insert	H12290	6	Socket head cap screw	Z31
2	Connection housing	H12270	7	Washer	Z561
3	Socket head cap screw	Z31	8	Cable duct	
4	Wiring box	H13100	9	Sliding nut	
5	Base plate		10	Support screw	H4030

The wiring plan can be found on the assembly drawing. The same applies for a hot half. This is followed by the wiring diagram for the standard HASCO wiring.

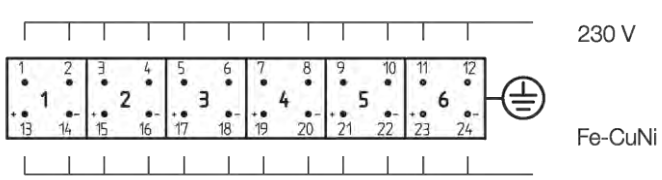

Figure 22: Terminal assignment as per DIN 15756 (HASCO standard)

Since the introduction of the Vario Shot nozzle series, screw-in nozzles have generally been used for wired systems. If floating nozzles are used, these are kept in place by retainer plates screwed onto the block.

In the case of a screwed system (H4016), the hot runner must be heated to at least 100°C during installation. Not following these instructions in severe damage to the manifold and the nozzles, as well as leakage can be the result.

4.7 Hot half (H4400, H4470)

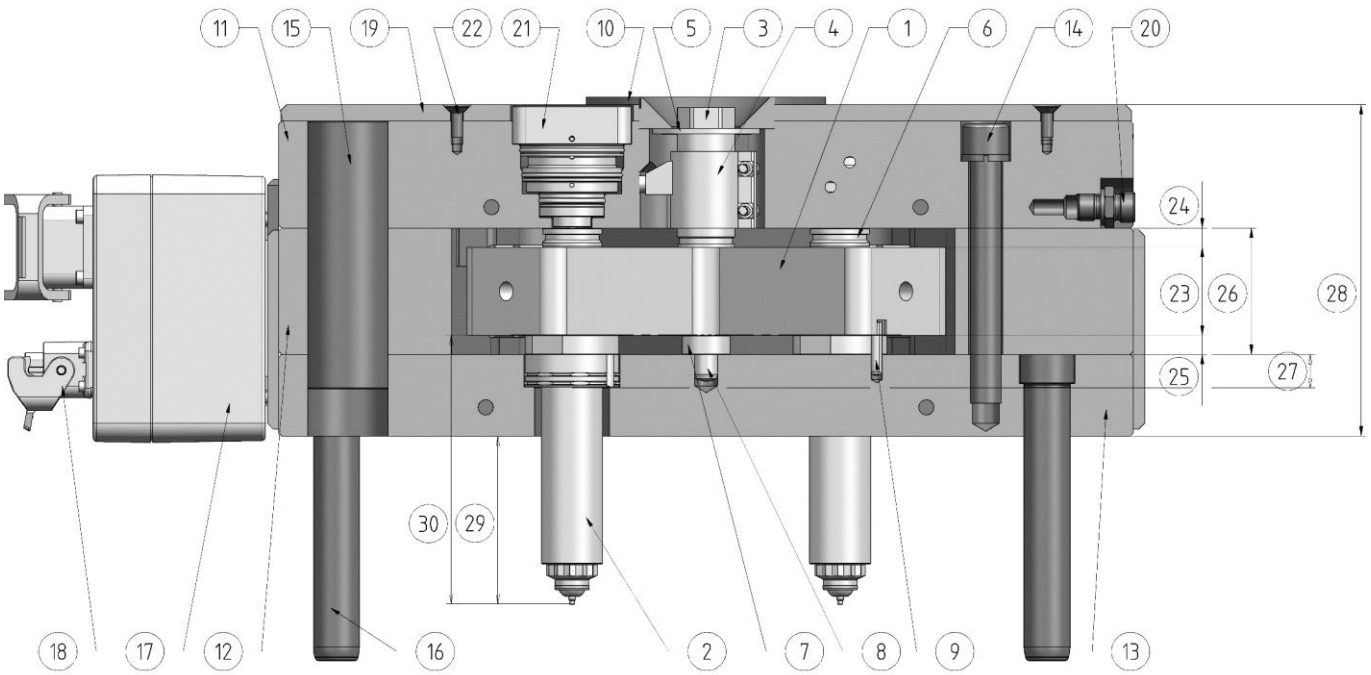

Figure 23: Individual parts - hot half

1	Hot runner manifold	11	Clamping plate	21	Needle valve
2	Hot runner nozzle	12	Frame plate	22	Countersunk-head screw
3	Sprue bushing	13	Nozzle holding plate	23	Block thickness
4	Heater band	14	Socket head cap screw	24	Air gap
5	Sealing disc	15	Centring sleeve	25	Air gap
6	Spacer	16	Guide pillar	26	Frame plate
7	Spacer	17	Wiring box	27	Installation dimension
8	Dowel pin	18	Electrical connections	28	System dimensions
9	Dowel pin	19	Thermal insulating sheet	29	Nozzle protrusion
10	Locating ring	20	Connecting nipple	30	Rated nozzle size

In the case of screw-in nozzles, the hot runner must be heated to at least 100°C during installation. Not following these instructions in severe damage to the manifold and the nozzles, as well as leakage can be the result.

5 Transport

This chapter contains illustrations and information on the packaging of HASCO hot runner equipment and the correct way to transport it.

5.1 Safety instructions

5.2 Packaging for the hot runner system

The following illustrations show the HASCO hot runner equipment in its delivery state.

If the packaging you receive is damaged, do not accept the delivery or only accept it under reservation and contact our Application Technology department without delay.

Check the delivery to make sure that everything is there. In case of a hot runner system compare your delivery with the parts list and the system drawings.

If possible, leave the goods in their packaging until immediately prior to use. If the hot runner equipment is to be used at a later date, please follow the instructions in Chapter 9: Storage. Always keep the delivery notice sent with your system in such a way that it can be allocated to your system.

In the event of defects, damage, missing goods or similar, please contact our Application Technology department within 24 hours. Please note that you can only assert a claim for compensation within the valid complaints period.

Contact details for HASCO hot runner Application Technology:

Tel.: +43 2236 202-500

hotrunner@hasco.com

5.2.1 Nozzles

Each HASCO hot runner nozzle is delivered to you individually packed in a cardboard box. This box contains a carrier board onto which the nozzle is fixed with a plastic film. In addition, one cardboard box per order contains a folder with installation instructions for your nozzle, shrink tubing and a name plate with information on your order. Depending on the type, the appropriate dowel pins will also be supplied to prevent rotation of your nozzle in the mould.

Figure 24: Nozzle packaging

Figure 25: Contents of a nozzle delivery

5.2.2 Hot runners and wired systems

The following illustrations show HASCO hot runners as they are delivered

Figure 26: Packaging for a HASCO hot runner system

HASCO hot runner systems are dispatched in a cardboard box. This is sealed with packing tape.

When cutting the packing straps make sure to do so without injury due to the strap or to incorrect handling of the cutting tool. Serious hand injuries can result. It is recommended to wear gloves at all times when working.

Figure 27: Opened box containing a hot runner

The hot runners are embedded in a special packaging foam for safe, damage-free transport. The associated nozzles and add-on parts are in a separate cardboard box, which is similarly secured by the foam.

Figure 28: Hot runner in film, embedded in packaging foam

The hot runner system is packed in anti-corrosion film. The packaging material used is not subject to any special disposal regulations and can be disposed of with the household waste.

If the systems are too big to be shipped in a cardboard box, they will be shipped in a crate as shown in Figure 29. The crates are then secured with transport belts.

If the systems weigh more than 100 kg, the packaging will be the same as they are for a hot half.

5.2.3 Hot halves

The following illustrations show HASCO hot halves as they are delivered

Figure 29: A hot half as delivered

HASCO hot halves are delivered on pallets in a wooden crate. To open the crate, undo the screws in the crate lid and open the lid. The lid is clamped against the side walls, so it may be useful to have a tool that can be used for leverage.

Figure 30: Opened transport crate

Inside you will find the packed hot half and the associated documentation, as well as any accessories packed separately in a box.

Release the retaining bars that press the hot half onto the pallet crosswise and lengthwise. These are screwed on from the outside, through the pallet wall.

The safety blocks screwed onto the pallet base normally do not have to be removed.

Figure 31: Hot half on the pallet after the protective caps have been removed

After opening the wax paper, you can briefly remove the protective caps from the nozzles in order to check the nozzle tips. Replace the caps and use the lifting threads provided at the sides of the hot half to lift it out of the crate.

We recommend that you keep the crate for shipping the hot half back to HASCO for overhauls or other work.

5.3 Unpacking and transporting the hot runner system

This chapter covers transport within a company site. For longer distances, or distances requiring a car or lorry or the like, please refer also to Chapter 8.5.1: Correct packing and shipping, and also Chapter 9: Storage.

To prevent accidents, only transport your product with a forklift truck or a pallet truck in combination with a suitable pallet. For smaller products, you can also use a suitable trolley. Make sure that the product is secured against falling and slipping and pay attention to your surroundings during transport so as to avoid accidents and abrupt manoeuvring!

If the product has to be lifted with a crane, check the load handling attachments and their installation very carefully. Keep the distances as short as possible and only lift the product above chest height if strictly necessary. You must wear a safety helmet in this case.

5.3.1 Nozzles

Remove the carrier board with the nozzle. To remove the nozzle from the plastic film, fold the two tabs that are bent onto the rear side of the cardboard onto the nozzle side. You can then pull the nozzle out of the plastic film in the direction of the cables. Separate the plastic film from the carrier board and send it for recycling.

5.3.2 Hot runners

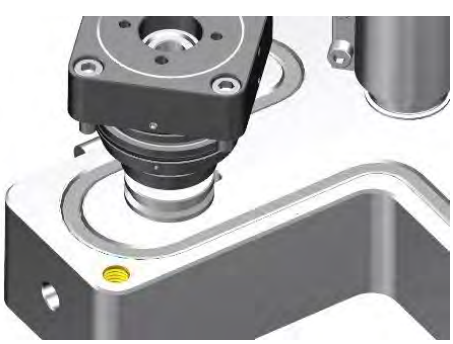

Figure 32: Transport thread on a hot runner

HASCO hot runner manifolds are generally equipped with threads for transport. These should be used in combination with suitable lifting eye bolts to install the hot runner manifold in the mould, and also to lift it out of the packaging. This principle does not apply to manifolds whose low weight does not require lifting aids. The illustration shows, by way of example, a hot runner manifold block with the transport threads marked (highlighted orange).

The protective caps on the nozzles should be left on the nozzles for as long as possible prior to installation of the system.

Remove the protective caps, check the nozzle tips, then replace the caps. Premature removal of the protective caps will increase the risk of damaging the nozzle tips. This similarly applies to hot halves.

The tips can also cause injury.

Transport over long distances using the transport threads is not recommended. Depending on the size of your hot runner system, you should use a transport trolley or a lifting trolley in combination with an appropriate pallet for this. Make sure that the hot runner is fixed in place during transport and cannot tip over.

Transport over long distances by means of the transport threads increases the dangers of suspended loads for both people and the hot runner manifold. This similarly applies to hot halves.

5.3.3 Hot halves

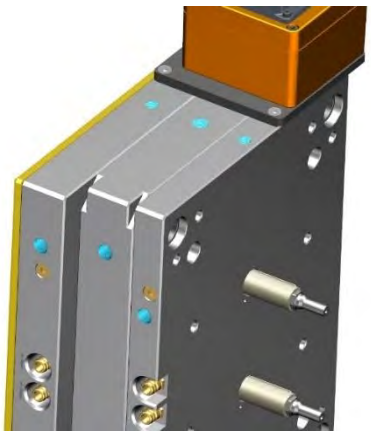

Figure 33: Transport thread on a hot half

HASCO hot halves are generally equipped with a sufficient number of threaded holes for transport (highlighted in blue in the illustration alongside). Use only these threads for screwing in transport hooks.

HASCO hot halves generally have transport threads on all four sides of the hot half, but not on the front surface. Since hot halves are individually produced, the position of the threads and the thread size can vary.

6 Installation of the hot runner system

The following Chapter sets out the installation sequences for HASCO hot runner systems. Please note that the illustrations are included by way of example and can differ depending on the system specification.

6.1 Safety notices

The work may only be carried out by qualified personnel. If work is to be performed on electrical systems, this may only be carried out by a qualified electrician.

6.2 Tools and materials required

Depending on the complexity of your hot runner system, you will need the following tools and materials

Table 3: Assembly tools and materials

Torque wrench	Circlip pliers
Allen wrench	Depth gauge
Crimp terminals	Multimeter
Wire stripper	Plastic hammer
Micrometer gauge	Screwdriver (cross/slot)
Crimping pliers	Side cutter
High-performance lubricant	Socket wrench

Always use high-quality tools that are intended for the job in question and which are not damaged or heavily worn.

6.3 Installation sequence

6.3.1 Hot runners (H4000, H4010) and wired systems (H4016)

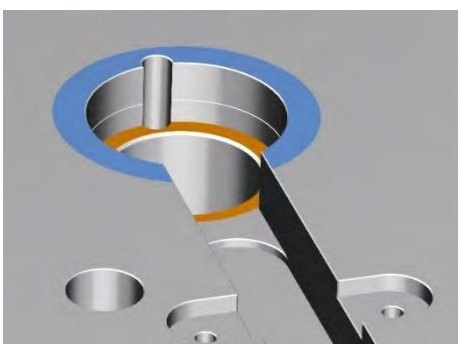

Figure 34: Checking the nozzle seat

Figure 35: Checking the fitting diameter at the head

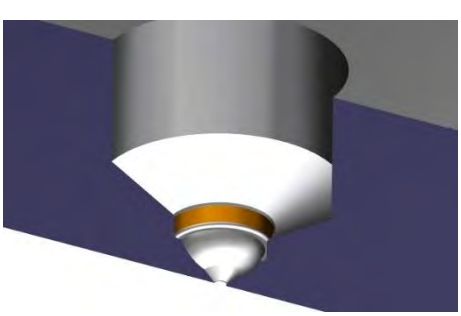

Figure 36: Checking the diameter close to the gate

Before starting on install the hot runner, make sure that all the parts to be fitted on the plates, such as the sealing plugs and hexagon socket pipe plugs, etc., have been fitted on the plates and have been checked for leakage.

1) Prior to installing the hot runner, check the nozzle installation depth in your nozzle holding plate at three points at 120-degree intervals (the distance between the blue and the orange surface in Figure 32) and compare the value with the specifications in the corresponding installation instructions or the design drawing for your hot runner. Only continue if the measured value is within the specified tolerances.

2) Check whether the fitting diameter is within the required tolerance. This must always be ØH7 unless specified otherwise.

3) In the event of screw-in nozzles, points 1) and 2) are not required.

4) Check whether the seal diameter close to the nozzle tip is within the required tolerance. This must always be ØH6 (highlighted in orange in Figure 36), unless specified otherwise. In the case of a nozzle with a melt chamber, a tolerance of ØH7 must be observed.

We recommend that you grind the seal diameter, since an eroded seal seat carries the risk of leakage, even if the prescribed dimensional and surface tolerances are adhered to.

If the system is designed with a needle valve gate, the gate diameter must also have a tolerance of H6.

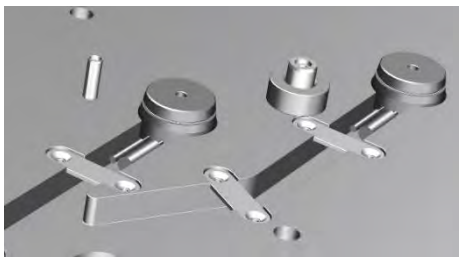

Figure 37: Centring with a dowel pin

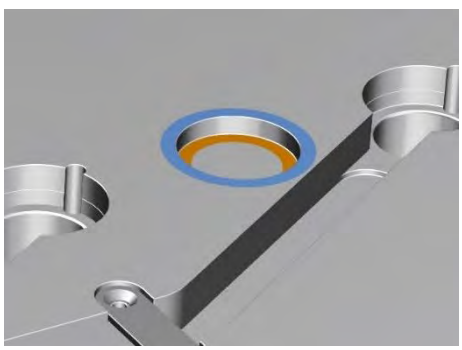

Figure 38: Centring with a locating ring

Figure 39: Mounted frame plate

5) Place the nozzle (and where necessary the nozzle dowel pin) in the nozzle holding plate. This step is not required for a wired system (H4016) and you may skip to point 7.
6) Number the zones for each nozzle and thermocouple cable in accordance with the planned control zone number.
7) Pass the cables through the cable duct and secure them for example with retainer plates.
8) Install the two dowel pins for centring and for preventing rotation in the nozzle holding plate. Where required, place the distance ring over the centring.
9) As an alternative to centring with a dowel pin, a locating ring may be provided. Here again, you should check the installation depth (distance between the blue and the orange surfaces in Figure 38) and compare this with the design drawing for your hot runner. If the value is within the specified tolerance, put the ring in position. No spacer disc is required in this case.
10) Depending on the design of your frame plate, it may be necessary for the hot runner or the wired system to be inserted in the nozzle holding plate at this stage already.

In the case of a screwed system (H4016), the hot runner must be heated to at least 100°C during installation. Not following these instructions in severe damage to the manifold and the nozzles, as well as leakage can be the result.

11) Check whether the thickness of the frame plate is within the tolerance shown on the design drawing. You may only continue if these dimensions comply with each other.

Depending on the design of the mould, the frame plate is put in position either before or after the hot runner is installed. In this example, we continue with the installation of the frame plate.

12) Mount the frame plate onto the nozzle holding plate.

When mounting plates, make sure that there are no body parts, tools, cables or other items between the plates. The plates should be thoroughly cleaned before they are assembled.

If this complies with the standards of your end product, it is also recommended to apply a small amount of anti-corrosion spray to the plates so as to facilitate subsequent separation of the plates.

13) Check whether the overall height of the hot runner matches the thickness of the frame plate.

The deviation of this dimension must be within the scope of preload and the thermal expansion of the hot runner block. This can be seen on the hot runner drawing in the tolerance specification for the frame plate in question.

14) Place the hot runner on the nozzles and dowel pins and insert the cables into the recess provided for them on the frame plate.

If work is to be performed on electrical components, this may only be carried out by a qualified electrician.

Make sure that the cables are not squeezed or pinched. This can cause the system to fail or result in the mould being electrically live.

Figure 40: Mounted hot runner

15) Mount the heater band on the sprue bushing and wire up both the hot runner and the sprue bushing heater.

Always take care to plan a sufficient allowance in the cable length to follow the specified cable duct and facilitate wiring.

Always use Crimp terminals to protect the cable strands.

16) Put the clamping plate in position and install the centring sleeves.

17) Put the screws in position and tighten these diagonally with a torque wrench. See Table 4 on this.

Figure 41: Mounting the clamping plate

Recommended tightening torques

Torques as per DIN EN ISO 4014 for screws with head support

Use only screws of strength class 12.9 or above.

During tightening, the mould must be secured against rotation, since the high torque could cause the hot half to slip. Depending on the type of support employed, this could result in a serious accident.

Table 4: Recommended tightening torques for 12.9-class screws

Screw size 12.9	Pre-tensioning force F_V (kN)	Tightening torque M_A (Nm)
M3	4,4	1,9
M4	6.9	4.8
M5	11.3	9.5
M6	16.0	18
M8	29.3	40
M10	46.6	79
M12	68.0	135

Figure 42: Ready-mounted hot half

18) Where available, mount the thermal insulation plate.
19) Place the sealing disc on the sprue bushing and fix it in place with the locating ring.
20) Install the electrical connections as per your wiring plan and all the other add-on parts.

To ensure that the thermocouple is not wrongly wired, you can also note that the positive pole will always be magnetic, in contrast to the negative pole.

In the case of a screwed system (H4016), the hot runner must be heated to at least 100°C during its installation in the cavity plate. Not following these instructions in severe damage to the manifold and the nozzles, as well as leakage can be the result.

To prevent injuries during wiring, it should be noted that there is a high risk of pricking oneself with the strands from the thermocouple, in particular.

Be careful and wear suitable safety gloves if possible. Use only the appropriate tools for cutting and stripping.

The same applies to cables with steel braid sheathing. Secure the interfaces with shrink tubing.

Work on electrical components may only be carried out when they have zero-potential.

6.3.1.1 Connecting the energy supply

The following work may only be carried out by a qualified electrician.

1) Check the current, the resistance values and the insulation values of your electrical installations. Record these and keep the test report available at all times, so that it can be allocated to the system.
2) Connect a controller to the hot runner system and check the functioning and allocation of the heating zones and make a record of these too.

Switch on one zone after the other to reveal any incorrect assignment of the heating zones and their thermocouples

Please note, that depending on the tubular heater length, these must be wired either in parallel or in series. If in doubt, consult the mounting instructions for the H11381/..., or contact our hot runner application engineer department.

In general, HASCO hot runner systems are equipped with type J thermocouples. Exceptions are possible through custom construction.

6.3.2 Needle valve systems

The following steps must also be taken if hot runners (H4000 and H4010) with needle values are fitted.

Always check in advance by hand whether the needles can be moved manually in the guide sleeves. You should also check whether the gate diameter in your mould matches that of the needles.

For all needle valve drives, a high degree of care is required when they are first brought into use. If the circlip has been forgotten on the pneumatic value, or is poorly fitted, this can have serious health consequences when the valve is subjected to pressure. You should thus wear protective goggles and should not stand behind the needle valve.

Unless said otherwise, references to figures in this chapter always apply to the figure left to the instruction.

6.3.2.1 Installing needle guide sleeves H107930

1) Spread spotting paste onto the contact surfaces between the needle guide sleeve and the manifold block. Then screw in the needle guide sleeve hand-tight.
2) Open the needle guide sleeve once again and remove the component. Check whether the impression on the distributor block is visible over the whole surface. Only continue if this is the case.
3) Clean the components with universal cleaning agent and remove all traces of the spotting paste.
4) Tighten the needle guide sleeve to 35 Nm at room temperature. The only exception here is needle guide sleeve H107930/2x7x20. This is tightened to 25Nm.

6.3.2.2 Pneumatic (H107910)

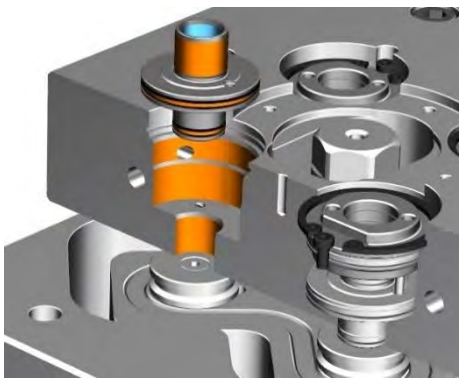

Figure 43: Areas to be greased

1) Thoroughly clean the piston running surface and the piston and make sure that there are no sharp edges or burrs on the running surfaces. Thorough cleaning of the supply channels is essential for trouble-free operation of the needle valve.
2) Then check that the supply channels are free from chips.
3) Grease the O-rings on the cylinder piston and the running surfaces with heavy-duty lubricant (HASCO Z260) (areas highlighted in orange in Figure 43). The area marked in blue must remain grease-free.
4) Insert the cylinder in the pocket together with the greased O-rings.

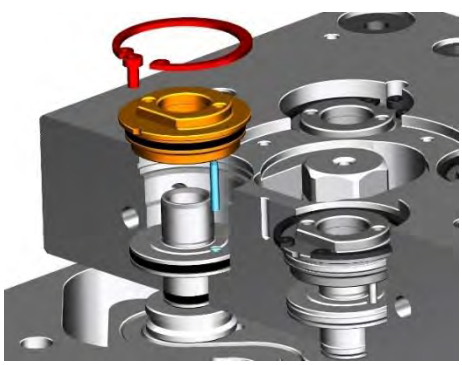

Figure 44: Fitted cover and piston

5) Place the dowel pin (in blue) in the intended position.
6) Put the cover (orange) in place and secure it with the circlip and screw (red).

Take care when fitting the circlip. If it jumps off the tool under tension, this can lead to injury in unfavourable cases. Wear safety goggles.

Figure 45: Valve needle, washer and needle holder

7) To mount the needle holder assembly, push the needle through the washer (orange).
8) Then insert the valve needle with the washer into the needle holder (blue),

Figure 46: Inserting the wedge

9) Insert the wedge (orange) into the needle holder so that the needle is held in place and the wedge does not protrude out of the side of the needle holder.

Figure 47: Screwing in the valve assembly

10) Screw the needle holder assembly (orange) into the cylinder piston.

Be careful not to grease the O-ring on the needle holder. The O-ring prevents the needle holder assembly from unscrewing and should provide the corresponding resistance.

11) For axial adjustment of the needle position, the needle holder assembly can now be screwed further in or out in the warmed-up state. The needle position changes by 60 µm per graduation line.

6.3.2.3 Hydraulic (H107900, H107920)

6.3.2.3.1 Fitting in the plate (H107900)

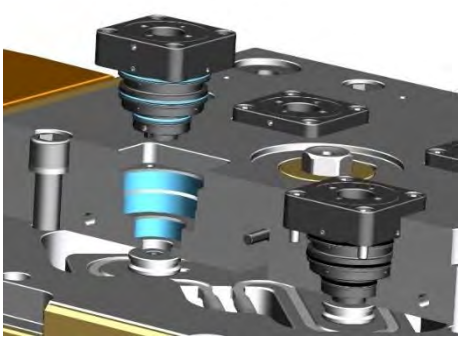

Figure 48: Areas to be greased

1) Thoroughly clean the recess for the needle valve and the piston and make sure that there are no sharp edges or burrs on the running surfaces. Thorough cleaning of the supply channels is essential to permit trouble-free operation of the needle valve.
2) Then check that the supply channels are free from chips.
3) Grease the O-rings on the piston unit and the running surfaces with heavy-duty lubricant (HASCO Z260) (areas highlighted in blue in Figure 43).
4) Insert the cylinder piston in the prepared recess together with the greased O-rings.

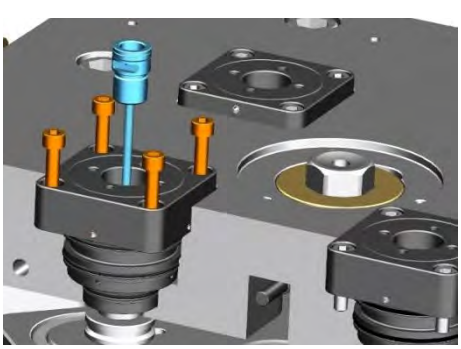

Figure 49: Inserting the needle holder assembly and tightening of the screws

5) Fasten the hydraulic unit with the corresponding screws (orange)
6) Then screw the pre-assembled needle holder assembly (blue) into the unit. The instructions for mounting the needle holder assembly are contained in Chapter 6.3.2.2.

6.3.2.3.2 Screwed onto the hot runner (H107920)

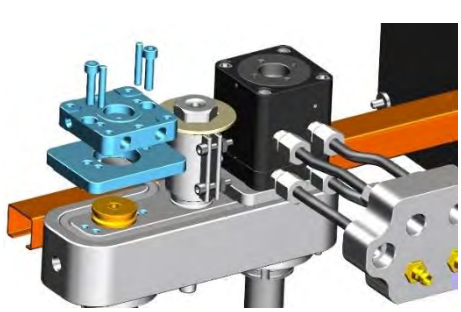

Figure 50: Mounting the cooling plate

1) Mount the needle guide sleeve (H107930) and put the distance ring in place (H107931) (highlighted in orange in the illustration)
2) The adapter plate and cooling plate are then pinned and screwed on (elements in blue)

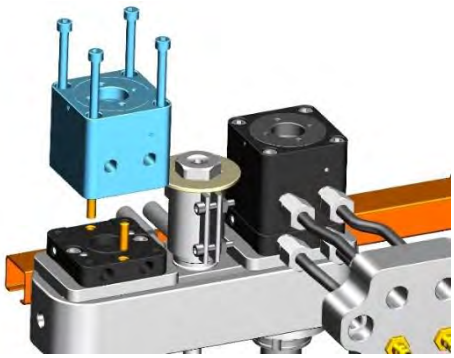

Figure 51: Screwing on the hydraulic block

3) Insert the dowel pins (highlighted in orange) into the cooling plate
4) Then mount the hydraulic block with the 4 socket head cap screws. You can also mount it in such a way that the connections for the cooling plate and those for hydraulic block are offset by 180° in relation to each other (cf. Figure 52 and Figure 53)

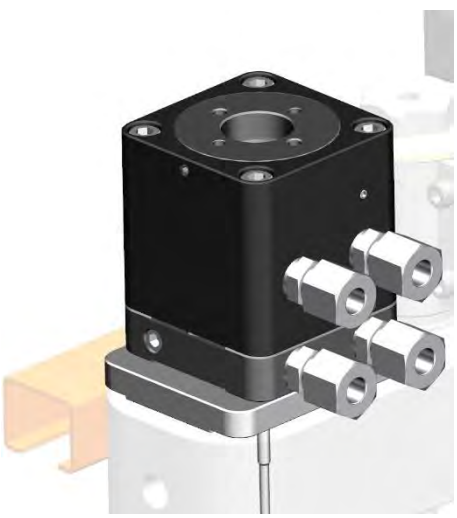

Figure 52: Actuation and cooling in the same direction

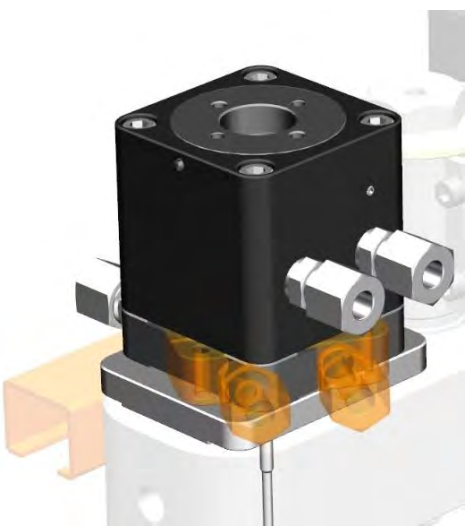

Figure 53: Actuation and cooling offset by 180°

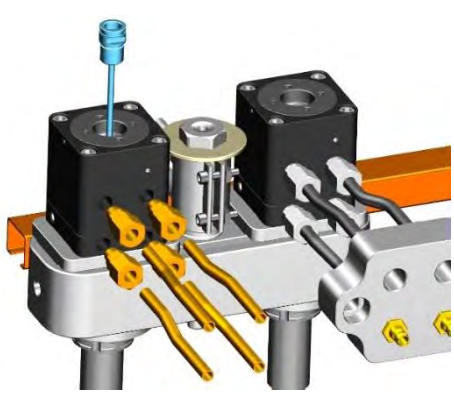

Figure 54: Mounting the needle holder assembly and the piping

5) Mount the screw-in couplings and the remaining pipework (highlighted in orange)
6) Screw the pre-assembled needle holder assembly (blue) into the unit. You will find the instructions for putting together the needle holder assembly in Chapter 6.3.2.2.

6.3.3 Hot half with plate control

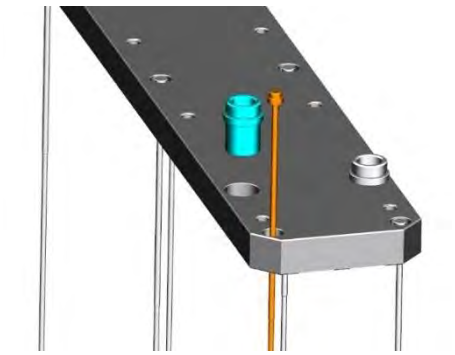

Figure 55: Mounting the needle and guide bushes

1) After the needle guide (H107930), the distance ring (H107931) and the backup plate have been mounted, you can start assembling the needle package by inserting the needles with the washer on them (orange) and the guide bushes (blue) into the nozzle-side plate of the needle package.

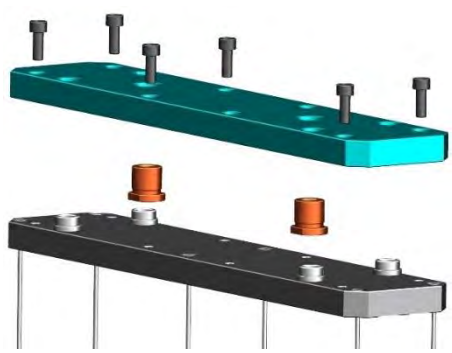

Figure 56: Screwing on the plate package

2) Insert the adaptors (orange) and any dowel pins and contact plates for proximity switches into the second half of the needle package (blue) and screw the two halves together.

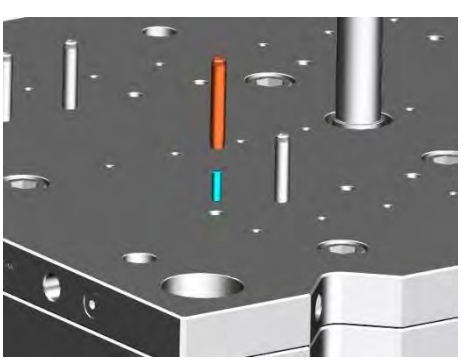

Figure 57: Inserting the guide elements

3) Screw the set screws (blue) and the guide pillar that goes on top (orange) into the frame plate. The frame plate can then be put in place.
4) If proximity switches are being used, in some cases, these must be mounted before the frame plate is mounted.

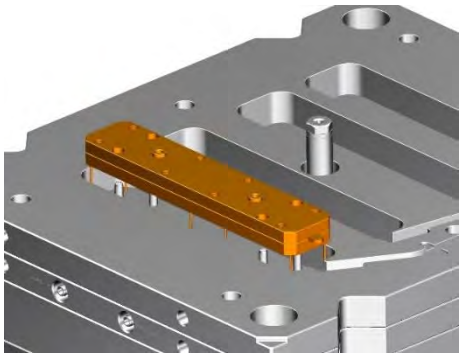

Figure 58: Inserting the needle package

5) Put the needle packages in position and mount any proximity switches.
6) Mount the clamping plate.

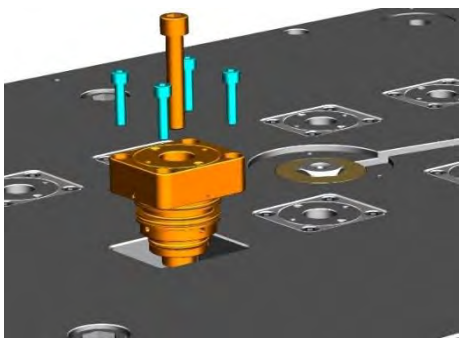

Figure 59: Mounting the actuation unit

7) As a final step, you can now install the piston(s) (see also the information in Chapters 6.3.2.2 and 6.3.2.3.1).
8) In the case of a hydraulic valve as shown here, the hydraulic unit is mounted in the plate with the screws (blue), and then the valve screwed onto the plate package with the screw (orange).

7 Process cycle

This chapter describes the procedures for safe commissioning once the mould has been set up on the injection moulding machine, for continuous operation and switching off, as well as for the safe operation of the hot runner system.

To conduct this procedure safely, you must observe these instructions together with the operating instructions provided by the machine manufacturer.

7.1 Safety instructions

When carrying out the corresponding work, ensure the necessary safety measures are taken, such as sufficient ventilation, protective clothing, safety goggles and face protection.

Work on the hot runner system, the mould, the injection moulding machine and the electrical systems may only be carried out by qualified personnel.

The operating instructions for your injection moulding machine must be observed at all times.

When the hot runner and its surroundings have been heated up, they may only be touched with suitable safety gloves. Long working clothes must be worn. Pay attention to the fact that the plastic melt is hot upon exiting the nozzle and tends to stick, depending on the type of plastic. If you do have to remove molten plastic, only do so using a brass tool.

The safety regulations for the material you are processing must always be followed. This may also necessitate extraction above the mould.

7.2 Initial commissioning

When you start up your system for the first time, follow the instructions set out in this chapter.

First follow the instructions for needle valves, if fitted.

When clamping a hot half to the injection moulding machine or when mounting the cavity plate onto the hot half, make sure that there are no body parts, tools, cables or anything else between the plates.

Components must be thoroughly cleaned before they are assembled.

In addition to the instructions in Chapter 7.3: Renewed start-up, the following points must also be observed:

Where possible, extrude through the open mould with a low pressure, otherwise perform filling with a moderate pressure and an appropriate injection speed.

The first filling processes fill the hot runner system so that the final shot volume can only be determined after a number of cycles.

Observe the processing and cooling guidelines issued by the material manufacturer.

7.3 Renewed start-up

The following steps must always be carried out before operating the hot runner.

1) Check the correct installation of the mould on the machine with the associated peripherals.
2) Ensure that the plastic to be processed has been correctly prepared (pre-drying, etc.).
3) Connect the mould cooling and, where appropriate, the hydraulic or pneumatic supply and check whether these are firmly secured. We recommend the use of safety couplings.
4) Connect the hot runner system with the corresponding control technology.
5) Check the correct pin assignment on the basis of the electrical connection diagram.
6) Prior to the start-up of the hot runner system, you should always start the mould cooling so as to avoid any damage to the system. Correct connection of the hoses as per the cooling plan is essential in order to guarantee a uniform temperature in the mould, the cavities and the hot runner nozzles.
7) The mould temperature recommended by the material manufacturer must be observed.
8) Correct earthing of the injection moulding machine must be ensured in conjunction with the control technology.
9) If a needle valve is fitted, it is also necessary to take note of sub-chapter 7.3.1: “Additional information for needle valves”.
10) If the controller has a diagnosis function, it is recommended that a diagnosis be conducted to check the correct pin assignment and monitor the functions, before heating up the hot runner system.
11) Heat the injection moulding machine to the processing temperature.

It is easier to purge material that remains in the injection moulding machine cylinder than material that remains in the hot runner manifold for too long. You should therefore heat the manifold system to the processing temperature at as a late a stage as possible.

12) Start the hot runner heating.

A clean, central connection of the Machine nozzle to the sprue bush is important in order to avoid defects.

13) Heat the hot runner system with the soft start function to the soft start temperature (approx. 120°C) preset in the controller. If the controller does not have a soft start function, heat the hot runner system to 120°C with a medium output level and remain at this temperature for approx. 10 min. You should then heat the entire hot nrunner system to the desired setpoint temperature using a heating group.

When the hot runner system is in the cold state, there is no positive connection between the hot runner manifold and the nozzles. A seal is only achieved through the preload when the operating temperature is reached.

The use of a heating group including the nozzle and manifold is thus recommended.

If a system uses a large outer heater sleeve (Single needle valve - H2010 or H2020, Multishot - H10325, H10425 or H10440, Multimodule H417x...), it is recommended that after the soft start, a gradual heating be employed.

Regardless of the System to be heated: Once the setpoint temperature has been reached, documenting the power consumption of the individual zones in the static state will provide a good indicator for further processes. Keep this documentation available at all times and ensure it can be allocated to the system.

You should also record the surface temperature in the mould in the region of the injection points.

Once the hot runner system is filled with plastic, it must not be kept at the processing temperature for too long without any exchange of material. There is a danger of a number of types of plastic degrading and decomposing in the system. Cleaning is then required.

Do not set the nozzle contact force any higher than is necessary to fill the mould and allow a safety factor of 1.5.

7.3.1 Additional information for needle valves

1) Close all the hydraulic/pneumatic lines on the mould and vent the hydraulic lines if fitted.

The hydraulic connections must be safety shut-off couplings and must withstand the specified operating pressure.

To prevent the inflow and return lines from being connected up incorrectly, the couplings/nipples are best fitted as male/female in opposite directions.

Only bring the hydraulic or pneumatic system into operation when the system (both the mould and the hot runner manifold, including the nozzles) is at the operating temperature.

With a pneumatic drive, it is necessary to have 6-8 bar compressed air (with an oiler and water separator)

With a hydraulic drive, the maximum hydraulic pressure may not exceed 50 bar.

In the case of a hydraulic drive, a starting pressure of 15 bar and a medium movement speed are recommended, which can then be increased if necessary.

Keep the distance between the pressure generator and the pressure consumer as short as possible and make sure that the hydraulic lines are not kinked or squeezed and that all the lines are the same length.

2) When step 13) in the “Renewed start-up” chapter has been completed, manually check the needle drive control.

Take care when opening the needles with an open mould. The hot plastic melt is under pressure and can escape in an uncontrolled manner. Always wear protective equipment. Severe burns could result.

3) After the valve stems have been opened, we recommend a time delay of approx. 0.2 seconds before the molten plastic is injected.
4) During the injection moulding process, the valve stems are only opened for the injection process and the holding pressure phase. The hot runner system is kept actively closed during the residual cooling time and during the demoulding of the injection moulded parts.
5) To end the injection moulding process, make sure that the valve stems for the hot runner system are in the foremost position (closed position) before switching off the heaters. Keep the mould cooling running at least until the temperature of the hot runner system has fallen to approximately 120°C.

Never activate the needle valve system after the heaters have been switched off. This may otherwise damage the system.

7.4 Initial sampling

In order to test the functions of the hot runner system in conjunction with an injection moulding machine, initial sample parts should be injection moulded to provide information on the processing parameters. We recommend always conducting a filling study of the injection moulded parts.

1) If possible, you should extrude the plastic through the open mould. The melt outflow should look uniform at all the gates. In the case of needle valves, the uniform opening of the gates can also be tested.

A secure fit of the machine nozzle, a reduced nozzle contact force and thorough cleaning of the machine nozzle and the mould to remove all material residue is essential for injecting into the open mould. Only a low injection pressure should be employed when injecting through the open mould. On systems with a needle valve, the needle is opened as the plastic is injected through and then closed during the metering phase

2) Following this, the standard sequence for the injection moulding cycle can be set. Before the shot volume is determined, we recommend a short shot without holding pressure, if possible. By measuring the weight of the preform and visually inspecting it, the precise process parameter settings can be improved. It is up to the machine operator to decide whether the cavity can be partially filled without damaging the mould.

7.5 Continuous operation

If use is made of external hot runner control equipment (a stand-alone unit) this should at very least be connected to the injection moulding machine via the alarm outputs. Otherwise, if there are problems, this could lead to serious malfunctions in the mould or hot runner system.

The temperatures and other processing information for the plastic should be taken from the information provided by the manufacturer. The specific processing temperature must have been attained prior to injecting the plastic.

It is recommended that the process data be logged and that the quality be constantly monitored.

7.6 Colour changes

First, the injection moulding unit on the machine is cleaned and, only thereafter, the hot runner system.

First, clean the screw of the plastification unit. When purging the melt, do not do this through the hot runner.

Observe the cleaning instructions issued by the purging material manufacturer and the recommendations of the machine manufacturer.

Purge material until no original (coloured) material emerges.

Next clean the hot runner system.

Increase the temperature in the entire hot runner system by 20-40°C (but do not exceed the temperature prescribed by the manufacturer). The mould temperature should be increased by 20°C.

If possible, you should inject/extrude through the open mould with a low injection pressure. To do this, clean the contact surface between the sprue bushing and the machine nozzle, reduce the nozzle contact force and make sure that the machine nozzle is securely positioned.

Ensure that the injection-side mould half is fixed sufficiently securely to the machine plate.

On systems with a needle valve, the needle is opened as the plastic is injected and then closed during the metering phase.

It is possible to use purging material here. Attention must be paid to the manufacturer’s instructions.

The hot runner system is clean when no more coloured material emerges.

If there are restrictions against purging with an open mould, the normal injection moulding process must be run until such time as no further coloured material emerges.

After cleaning the cylinder and hot runner system, the temperatures are reduced to the process temperature again and a new colour can be used. Here again it is best to extrude/inject plastic through the open mould until the new colour emerges cleanly.

If streaks of the previous colour still emerge at irregular intervals, the plastic must be manually removed from the wells.

The use of colour batches can influence the viscosity and the weld lines, etc. It may be necessary to adjust the process parameters.

Fluorescent batches tend to adhere to surfaces. In this case, it may be necessary to clean the system completely. Contact our Application Technology department about this.

7.7 Process interruption

In the event of an extended process interruption, the temperature in the hot runner should be reduced.

If the plastic melt is kept at the processing temperature for a long time, this can damage the melt, and even cause the plastic to degrade or damage the hot runner. It will then be essential to clean the system.

The corresponding processing temperatures are contained in the plastic manufacturer's data sheets. Depending on the material type, the temperature should be reduced by 50°C to 100°C in the event of a process interruption.

The mould cooling must always be kept switched on to prevent any build-up of heat that could damage the system.

When operating with needle valve systems, the needles must remain closed and must not be moved when the temperature has been reduced otherwise the system can be damaged.

Before resuming continuous operation, the system must be heated up to the process temperature again. When starting up the hot runner system, it may be necessary to increase the temperature profile for individual zones or the entire hot runner system (boost function on the controller).

You will find the corresponding steps for this in the operating instructions for the controller.

7.8 Ending production

At the end of production, we recommend comparing the data with the power consumption at the start of the process so that any errors that occur can be analysed at an early stage. Note the relevant data in the corresponding document.

If a heat-sensitive polymer has been processed, then before the system is switched off, the hot runner system should be purged

with a heat-resistant material that has the same processing temperature.

On a needle valve system, the needles must be closed at the end of the process.

All the control circuits are always switched off at the same time.

Non-uniform cooling can cause leakage.

The mould cooling must keep operating until the hot runner system has cooled down.

Caution! A heat build-up can damage the system.

Only switch off any hydraulics or pneumatics that are connected once the system has fully cooled down.

Only after the preceding points have been completed and the system has been disconnected from the power supply may the power and signal cables be disconnected.

7.9 Emergency stop

If it happens that the hot runner cannot be switched off properly, the emergency stop switch must be operated.

The hot runner may only then be switched on again by qualified personnel as a matter of principle. Further steps, such as cleaning the hot runner or the like must be decided on separately, on a case by case basis.

If no further steps are necessary, disengage the emergency stop, including any fault messages, and continue with Chapter 7.3: Renewed start-up.

8 Maintenance and repairs

8.1 Safety instructions

When carrying out the corresponding work, ensure the necessary safety measures are taken, such as sufficient ventilation, protective clothing, safety goggles and face protection.

Work on the hot runner system, the mould and the electrical systems may only be carried out by qualified personnel.

Never stand the product upright. Work on the hot runner systems must be performed in such a way that the systems cannot tip over. If necessary, place wooden blocks or the like underneath, in order to protect protruding elements like nozzles or sprue bushings.

You will be working with hot objects. Wear the appropriate work gloves and long-sleeved working clothes.

If plastic residues have to be removed, you should be aware of the danger of harmful vapours being released. Work under an extraction hood or wear a respiratory protective mask. A fire can also be easily ignited. The work must therefore only be carried out in a flame-proof environment and in suitable work clothing. The corresponding safety devices must also be in place. As an alternative, you can, of course, make use of our maintenance and repair service.

8.2 Tools and materials required

Different tools are required as a function of the components to be maintained. You will find a list of all the materials here:

Table 5: Tools required for mainten ance work

Wire stripper	Multimeter
Crimp terminals	Screwdriver (cross/slot)
Micrometer gauge	Heat shrink tubing + heat gun
Crimping pliers	Side cutter
Torque wrench	Circlip pliers
High-performance lubricant	Socket wrench
Allen wrench	Depth gauge
Plastic hammer	Spotting paste
brass wire brush	pliers
brass pliers	

Always use only high-quality tools that are intended for the job in question and which are not damaged or heavily worn.

8.3 Maintenance plan

The maintenance intervals should be determined as a function of the plastic being processed and the application. In the case of average use, the values in Table 6 apply. Tests can be carried out at any time as described in chapter 7.4 to check that the hot runner is working properly.

Table 6: Maintenance plan

Maintenance interval	Maintenance tasks	Required personnel
When necessary	Clean nozzles	Qualified worker
When necessary	Clean manifold	Qualified worker
When necessary	Clean shut-off needles	Qualified worker
approx. every 300,000 shots	Clean needle drives	Qualified worker

We will be pleased to draw up a suitable maintenance plan for your HASCO hot runner system for you.

8.4 Maintenance and repair advice

If you have to maintain a component that is not included in the following list, please contact our Repair and Maintenance Department. Have the order number or the system number at hand so that we can help you as rapidly as possible. Chapter 3.7 tells you where to find this number.

Tel.: +43 2236 202-500

Fax: +43 2236 202-12500

repair.hk@hasco.com

8.4.1 Maintenance, dismantling and mounting of a hot runner or mono nozzle

Prior to servicing the nozzles, they must always be removed and the maintenance must not be carried out in a mounted state in order to avoid damage to the nozzle, hot runner and mould.

All nozzles must be cleaned with compressed air before the component parts are dismantled and must be free of coarse material residues. Pay great attention to the correct clamping of the nozzles during dismantling. If the nozzle is clamped incorrectly or too tightly, it can be damaged. Fitting and contact surfaces can be deformed. You will find information on the correct clamping method and also further details of the individual nozzle types in the chapters to follow.

The following points should be kept in mind for nozzle maintenance:

- Is there any evident wear on the tips?
- Are the fitting diameters damaged? (streaks, grooves, deformation)
- Are the nozzles and melt channels corroded or have they been chemically attacked?
- Does an electrical function test reveal problems? (current, insulation resistance, earthing)
- Are the heaters and thermocouples functioning improperly?
- Are cables damaged?

If at least one of the questions can be answered with “yes”, then at least the component concerned needs to be replaced. The following chapter explains the removal and mounting of different nozzle types.

To remove the nozzles, heat these to the maximum permitted processing temperature of the plastic and blow them out with bursts of compressed air.

Hot plastic residues can emerge from the nozzle while you are doing this! Wear your personal protective equipment, pay attention to your surroundings and take precautions to ensure that these residues can be collected immediately as they leave the nozzle without posing any danger. Very serious burns can result if this is not carried out correctly.

Work on electrical components may only be carried out when they have zero-potential.

Between the bursts of compressed air, give the plastic sufficient time to heat up again, since it will rapidly cool in the air. In the breaks between bursts of air, clean the nozzle tip with a brass brush.

Where nozzles have been overmoulded, the plastic resting on the nozzles will be highly damaged (possibly burned) during heating. Observe the protective measures in the material data sheet with regard to burning plastic and wear the corresponding protective equipment.

Next, let the nozzle cool or heat up to the removal temperature (this corresponds to the installation temperature plus 20°C). Continue the removal process as set out in the chapter for your type of nozzle.

You will find the installation and removal temperatures in the installation instructions that go with your nozzle, or you can contact us about this.

Special case: defective thermocouple

If the thermocouple is defective, the heater must be controlled via an external thermocouple.

The following figures contain recommended positions for the use of an external thermocouple (TC):

Figure 60: External TC Vario Shot shaft heater

Figure 61: External TC Value Shot

Figure 62: External TC Techni Shot

If a thermocouple is defective which forms a single unit with the heater, then this entire unit must be replaced. Heat the zone for the defective component until you can separate this heating element from the nozzle and then immediately switch it off.

Special case: defective heater

In this case, the temperature required for heating must be applied by an external heat source. The plastic can then rapidly overheat.

The installed thermocouple must not be used again under any circumstances, since it is very likely to have been damaged by the external application of heat.

The nozzle must be thoroughly cleaned after removal.

Installation and removal temperatures

The installation temperatures for nozzle tips and the torque required for mounting the sleeve nuts and melt chambers may be found in our current hot runner catalogue or in the chapters that follow.

The removal temperature is 20°C higher than the installation temperature.

To work on nozzles, you basically need the following tools. Further tools are listed at the corresponding nozzle.

Table 7: General tools required for working on nozzles

Wire stripper	Multimeter (für eine abschließende Prüfung)
Crimp terminals	Heat shrink tubing + heat gun
Crimping pliers	side cutter
Torque wrench	Spotting paste
brass wire brush	universal cleaning agent
brass pliers	pliers

In addition, you need the appropriate control technology to heat up the nozzles.

8.4.1.1 Vario Shot (H61xx, H62xx, H65xx)

8.4.1.1.1 required tools

Table 8: Required tools and sizes: Maintenance Vario Shot

nozzle size	25	32	40	50
Multi-edge nut for torque wrench	12	15	19	23
Hexagon socket (thermal probe ring)	1,3	1,5	1,5	1,5
Hexagon socket (heater)	1,5	1,5	1,5	1,5
Hexagon socket (nozzle body part 2)	2,5	2,5	3	4

8.4.1.1.2 Clamping

Figure 63: Clamping the Vario Shot

Figure 64: Clamping the screw-in Vario Shot

Figure 65: Clamping the Vario Shot mono nozzle, fitting the torpedo

Figure 66: Clamping the Vario Shot mono nozzle, fitting the head

Only clamp on the spanner flats. Clamping may also be performed without soft jaws

8.4.1.1.3 Dismantling

1) Remove the shrink tubing that keeps the thermocouple and heater wires together.
2) After the removal temperature has been reached, the sleeve nut or pre chamber can be unscrewed.
3) The torpedo can then be taken out. To do this, use pliers with a soft metal on the contact surfaces with the torpedo.

If only the heater is to be exchanged, this can be done without removing the sleeve nut and the torpedo.

4) Remove the thermocouple retainer ring, the heater and the thermocouple from the groove. If using an H6500 screw-in nozzle, it is now fully dismantled.

Bending a thermocouple several times can cause it to fail.

A thermocouple that has been used must never be installed in the system again. Always use a new replacement part.

5) Re-clamp the nozzle to give you access to the four socket head cap screws on the head side of the nozzle and remove these.
6) The part denoted “Nozzle body, Part 2” in Figure 11 is now loose and can be removed. If using an H6100 nozzle, it is now fully dismantled.
7) If you have an H6200 mono nozzle, you can now also remove the adapter disc, the circlip, if available, the head heating unit, and the fitted thermocouple.

It can happen that the head heating unit is too tight for it to be easily removed. That is normal. Heat up the head heating unit in order to remove it and pull it off during the heating process.

8.4.1.1.4 Mounting

1) Clean all the components and check the sealing surfaces for cleanliness and wear and/or damage.

Dirty sealing surfaces lead to leaks and system flooding. Mechanically damaged parts cause premature failure.

Damaged cable insulation causes insulation problems. Electrical components should be inspected since electrical arcs can quickly occur.

If an H6200 mono nozzle is being assembled, take care in the first step to ensure the correct orientation of the “nozzle body, part 2” and the “nozzle body part 1”. The milled recess on the fitted “nozzle body, part 2” and the hole for the thermocouple on the flat surface at the head end of the “nozzle body, part 1” must be on the same side.

If the parts are incorrectly aligned as they are being fitted, damage can be caused to nozzle parts if they are subsequently rotated.

2) Push the “nozzle body, part 2” onto the body and fix it from the opposite side with the four socket head cap screws. In the case of a H6200 mono nozzle, the screws initially only serve to prevent rotation.
3) In the following table you will find the permitted tightening torques for the screws that fix the "Nozzle Body Part 2":

Table 9: Tabelle 10: mounting torques: Vario Shot – nozzle body Part 2

screw dimension	M3	M4	M5
mounting torque / Nm	1,8	4,1	8,4

4) Now clamp the nozzle as prescribed. For a screw-in H6500 nozzle, assembly only commences with the following step.

In the case you are dealing with a front-sided cable outlet, follow the steps in this message box:

i. Slide the heater onto the nozzle body and measure the distance from the end of the heater on the side of the tip to the end of the notch which is milled into the nozzle body and meant for the thermocouple to be held in.
ii. Remove the heater and position the thermocouple inside the heater. Let the thermocouple protrude the heater by the measurement just taken. Also, consider that the notch in the heater is on the opposite side of the tip of the thermocouple and the thermocouple is in alignment with the notch.
iii. Bend the thermocouple by 180° through the notch. Be aware not to kink and therefore break the thermocouple. A wider radius which protrudes the end of the heater by a millimeter will help you in the following steps. To guarantee, that the thermocouple is not damaged by this step we recommend testing it at this point.
iv. Now separate the heater from the thermocouple and set it into the groove of the body. Be aware that the tip of the thermocouple must be in contact with the end of the groove. This must be the case throughout the whole assembly and beyond. Push the thermocouple into the groove as far as possible.
v. Hold the thermocouple in position and set the heater onto the body. Be aware of the right positioning of the notch on the heater. It must be on the other side of the tip and aligned with the notch in the nozzle body.

vi. You can now slide the heater onto the body. Hold the thermocouple in position as long as possible to prevent a shift in the position of the thermocouple. On top of that, you can slightly pull on the bent thermocouple. When finished, the thermocouple must sit in the notch of the heater.

vii. Check, if the thermocouple still is in the top position, touching the end of the groove. If this is not the case, the previous steps must be repeated. It might help to carefully adapt the bending of the thermocouple, so it may jam itself between the top of the notch and the head of the nozzle. After this, continue with step 7).

5) Place the thermocouple in the milled groove by hand.

The thermocouple must be placed at the nozzle-tip end of the groove in order to avoid incorrect measurements. This must always be the case.

6) Push the heater over the nozzle body as far as possible and make sure that the outgoing cable at the head end of the nozzle falls into the notch. The thermocouple must not slip while this is being done. Also make sure that the heater cables are not pressed against the side of the nozzle body.

It must be possible to slide the heater onto the nozzle without exerting too much force.

If it proves difficult to slide on the heater on, you can heat up the heater and slide it over the nozzle shaft during the heating process. This could, however, lead to overheating and destruction of the nozzle heater, so do this with caution and shut off the heater as soon as it fits.

The use of mounting paste will come in handy when dismantling the nozzle again.

7) Then slide the sensor retainer ring onto the body and fasten the heater and the sensor retainer ring in position with the grub screw. The sensor retainer ring and the heater should not touch each other as you do this. Keep them at least 0.1 mm apart!

The body has a locking position at the point at which the grub screw is to lock in place.

To maintain the distance of 0.1 mm, we recommend using a gauge strip or similar. (cf. Z257)

8) Using shrink tubing, secure the thermocouple and heater outgoing line close to the nozzle. Also bind the two cables together with a cable binder in order to take any strain off the thermocouple.

9) Apply spotting paste to the contact surfaces of the torpedo, the sleeve nut or melt chamber.

10) You should then first put the torpedo in place and then screw in the sleeve nut or melt chamber hand-tight.

Only hand-tighten the sleeve nut or melt chamber.

The parts can be damaged if they are tightened with a higher torque.

11) Open the nozzle once again and remove both parts. Check whether the impressions on the torpedo and the nozzle body are visible over the whole contact surface. Only continue if this is the case

12) Clean all the parts with universal cleaning agent so that they are free of grease and spotting paste.

Poorly degreased parts can mean that the prescribed pre-tensioning forces for the torpedo are not respected, leading to damage.

Likewise, no assembly paste, thermal paste, or similar is allowed.

13) Put the torpedo in place again and heat the nozzle to the installation temperature.

14) Once the installation temperature has been reached, tighten the pre chamber or the sleeve nut to the prescribed tightening torque. The tightening torques are given together with the installation temperature in the corresponding installation instructions as well as in the table below.

Mounting torques for pre chambers and sleeve nuts

The following table sets out the installation torques and associated temperatures for the Vario Shot nozzle series. Please note that TZM torpedoes must be allowed to cool down after they have been tightened up the first time. They must then be tightened up again at the installation temperature.

Table 11: Installation of the Vario Shot

Nominal diameter	Torque / Nm	Temperature / °C
25	30	290
32	35	
40	50	
50	65	320

15) Also re-tighten the grub screws to fix the heater and thermocouple ring in place.
16) Let the nozzle cool to 50°C.
17) Then heat up the nozzle again, allowing the nozzle 5 minutes to adjust, and then tighten it once more.
18) In the case of a screw-in nozzle, undo the grub screws and remove the thermocouple ring, heater and thermocouple and mount the parts again as soon as the nozzle has been mounted on the block.
19) If you are assembling an H6200 mono nozzle, allow the nozzle to cool.
20) Re-clamp the nozzle so that you can undo the screws holding the “nozzle body, part 2” in place.
21) Undo the screws, insert the thermocouple for the head heating unit and bend this in the direction of the groove in the “nozzle body, part 2”.
22) Slide the head heating unit over both the nozzle bodies. Everything is then held in place with the adapter disc and fastened with the screws.

If it proves difficult to slide the heater on, you can heat up the heater and slide it over the nozzle shaft while it is being heated. This could, however, lead to overheating and destruction of the nozzle heater, so do this with caution and shut off the heater as soon as it fits.

8.4.1.2 Single Shot (H63xx)

8.4.1.2.1 Clamping

Figure 67: Single Shot clamping

Only clamp on the spanner flats (highlighted in Figure 67 in orange).

Use only soft jaws.

It is only possible to replace the thermocouple, torpedo and sleeve nut on this torpedo.

8.4.1.2.2 required tools

Table 12: Required tools and sizes: Maintenance Single Shot

nozzle size	32	40
Multi-edge nut for torque wrench	15	19

8.4.1.2.3 Dismantling

1) After the removal temperature has been reached, the sleeve nut or pre chamber can be unscrewed.
2) The torpedo can then be taken out. To do this, use pliers with a soft metal on the contact surfaces with the torpedo.
3) Unclip the thermocouple and remove the shrink tubing which keeps the thermocouple and the heater cables together.
4) The thermocouple can now be removed. The nozzle is fully dismantled. Replacement of the heater can only be done by HASCO hot runner.

8.4.1.2.4 Mounting

5) Clean all the components and check the sealing surfaces for cleanliness and wear and/or damage.

Dirty sealing surfaces lead to leaks and system flooding. Mechanically damaged parts cause premature failure.

Damaged cable insulation causes insulation problems. Electrical components should be inspected as electrical arcs can quickly occur.

6) Clamp the nozzle as described above.
7) Fit the thermocouple in the hole at the tip of the nozzle, hold it in position and bend the thermocouple towards the head of the nozzle. Secure it with the thermocouple-clips.
8) Using shrink tubing, secure the thermocouple and heater outgoing leads close to the nozzle. Also bind the two cables together with a cable tie in order to take any strain off the thermocouple.
9) Apply spotting paste to the contact surfaces of the torpedo and sleeve nut or pre chamber.
10) You should then first put the torpedo in place and then screw in the sleeve nut or melt chamber hand-tight.

Only hand-tighten the sleeve nut or pre chamber.

The parts can be damaged if they are tightened with a higher torque.

11) Unscrew the sleeve nut or melt chamber once again and remove it and the torpedo. Check whether the impressions on the torpedo and the nozzle body are visible over the whole contact surface. Only continue if this is the case
12) Clean all the parts with universal cleaning agent so that they are free of grease and spotting paste.

Poorly degreased parts can mean that the prescribed pre-tensioning forces for the torpedo are not observed, leading to damage.

13) Put the torpedo in place again and heat the nozzle to the installation temperature.
14) Once the installation temperature has been reached, tighten the pre chamber or the sleeve nut to the prescribed tightening torque. The tightening torques are given together with the installation temperature in the corresponding installation instructions as well as in the table below.

Mounting torques for pre chambers and sleeve nuts

The following table sets out the installation torques and associated temperatures for the Single Shot nozzle series. Please note that TZM torpedoes must be allowed to cool down after they have been tightened up the first time. They must then be tightened up again at the installation temperature.

Table 13: Installation of the Single Shot

Nominal diameter	Torque / Nm	Temperature / °C
32	35	290
40	50	

15) Let the nozzle cool to 50°C.
16) Then heat up the nozzle again, allowing the nozzle 5 minutes to adjust, and then tighten it once more.

8.4.1.3 Techni Shot (H33xx, H34xx)

8.4.1.3.1 Clamping

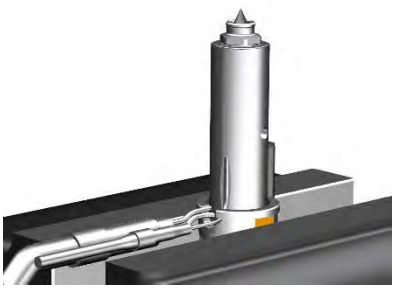

Figure 68: Clamping the Techni Shot

Only clamp on the spanner flats (highlighted in orange in Figure 68). Clamping may also be performed without soft jaws.

8.4.1.3.2 required tools

Table 14: Required tools and sizes: Maintenance Techni Shot

nozzle size	20	25	32	40	50	60
Hex socket for torque wrench	9	13	16	20 (sleeve nut) 21 (prechamber)	27	32

8.4.1.3.3 Dismantling

1) After the removal temperature has been reached, the sleeve nut or prechamber can be unscrewed.

If copper tips are used, there is no need to heat the nozzle.

Contrary to the case for the Vario Shot, the heater and thermocouple can only be replaced by removing the tip and the sleeve nut beforehand.

2) The torpedo can then be taken out. To do this, use pliers with a soft metal on the contact surfaces with the torpedo.
3) The thermocouple ring can be removed by lifting it up uniformly around its circumference.

Excessive bending of the ring will cause damage and lead to failure of the thermocouple.

4) The heater can then be pulled off upwards.

If the heater is very tight, you can let the nozzle cool and then remove the heater afterwards as it is heating up. Caution: since the thermocouple is missing, there is a danger of the heater overheating and being destroyed.

8.4.1.3.4 Mounting

1) Clean all the components and check the sealing surfaces for cleanliness and wear and/or damage.

Dirty sealing surfaces lead to leaks and flash on parts. Mechanically damaged parts cause premature failure.

Damaged cable insulation causes insulation problems. Electrical components should be inspected in particular, since electrical flashovers can quickly occur.

2) Clamp the nozzle body as specified.
3) Slide the heater over the nozzle body until it reaches the stop and make sure that the outgoing cable on the head side of the nozzle fits into the groove.

It must be possible to slide the heater onto the nozzle without exerting too much force.

4) Then push the thermocouple ring as far as the shoulder.
5) The thermocouple cable is bent as far down as possible in the region of the heater output.

A resistance must be felt when the thermocouple is pushed on. It must not be easy to remove.

The thermocouple cable must be close to the body and can be fastened in position with temperature-resistant adhesive tape.

6) Use shrink tubing to secure the thermocouple and heater output.
7) Apply the spotting paste to the contact surfaces of the torpedo and the sleeve nut or pre-chamber.
8) You should then first put the torpedo in place and screw in the sleeve nut and melt chamber hand-tight.
9) Open the nozzle once again and remove both parts. Check whether the impressions on the torpedo and the nozzle body are visible over the whole contact surface. Only continue if this is the case.
10) Clean all the parts with universal cleaning agent so that they are absolutely free of grease and spotting paste.
11) Put the torpedo in place again and heat the nozzle to the installation temperature.
12) Once the mounting temperature has been reached, tighten the sleeve nut or pre-chamber with the prescribed tightening torque.
13) Let the nozzle adjust for 5 minutes and then tighten it again.

Mounting torques for melt chambers and sleeve nuts

The following table sets out the mounting torques and associated temperatures for the Techni Shot nozzle series. Please note that TZM torpedoes must be allowed to cool down after they have been tightened up the first time. They must then be tightened up again at the installation temperature.

Table 15: Mounting the Techni Shot

	CuCoBe		TZM	
Nominal diameter	Torque / Nm	Temperature / °C	Torque / Nm	Temperature / °C
20	6	20	8	290
25	10		30	
32	15		35	
40	20		45	
50	25		55	
60	35		65	320

Special instructions for mounting a Techni Shot with a diameter of 20mm

After clamping the nozzle body as prescribed, continue as follows:

1) Mount the thermocouple in the heater.

The thermocouple must be pushed in, without exerting excessive pressure, until it snaps into place.

2) Before the heater is pushed on to the nozzle body, the nozzle body must be coated with a mounting paste.
3) Continue with point 6.

8.4.1.4 Value Shot (H202xx)

8.4.1.4.1 Clamping

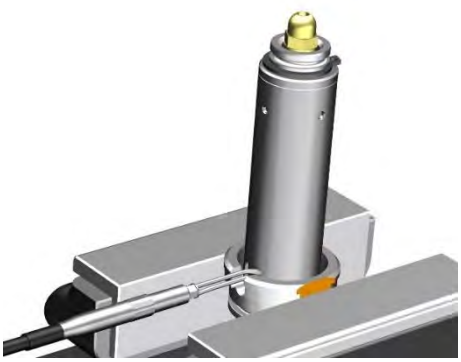

Figure 69: Clamping the Standard Shot

Clamp on the nozzle head

Use the flat point (highlighted in orange) on the nozzle body to prevent any rotation.

On the predecessor model Z200, it is not possible to replace the heater and thermocouple.

Use only soft jaws.

8.4.1.4.2 required tools

Table 16: Required tools and sizes: Maintenance Value Shot

nozzle size	25	32	45
Hex socket for torque wrench	10	12	14

- circlip pliers

8.4.1.4.3 Dismantling

1) Once the removal temperature has been reached, you should first remove any MurSeal® cap.

If copper tips are used, there is no need to heat the nozzle.

Always pull the MurSeal® cap off the nozzle in a straight line. If the cap is rotated, this can lead to loosening the tip or cause damage to the nozzle tip.

2) The torpedo can then be unscrewed.

Make sure that the torpedo is not subjected to any shocks. This could cause damage to the torpedo, and particularly its tip.

3) Remove the circlip. You can then pull off the heater upwards.

8.4.1.4.4 Mounting

4) Slide the heater onto the body. The thermocouple is integrated in this.

It must be possible to slide the heater on without exerting excessive pressure.

5) Place the circlip in the groove above the heater. The preceding model (Z200) does not have a circlip.

6) Apply spotting paste to the bottom of the torpedo.
7) You should then put the torpedo in place and screw it in hand-tight.
8) Open the torpedo again. Check whether the impression on the nozzle body is visible over the whole surface. Only continue if this is the case
9) Clean all the parts with universal cleaning agent so that they are absolutely free of grease and spotting paste.
10) Put the torpedo in place again and heat the nozzle to the mounting temperature.
11) Once the mounting temperature has been reached, tighten the torpedo with the prescribed tightening torque.

If copper tips are used, there is no need to heat the nozzle.

12) For a TZM torpedo, let the nozzle cool to 50°C. Then heat the nozzle up again, allowing the nozzle 5 minutes to adjust, and tighten it once more.

Mounting torques for melt chambers and sleeve nuts

The following table sets out the mounting torques and associated temperatures for the Value Shot nozzle series. Please note that TZM torpedoes must be allowed to cool down after they have been tightened up the first time. They must then be tightened up again at the installation temperature.

Table 17: Mounting the Techni Shot

Nominal diameter	CuCoBe		TZM			
			H20213		H20214	
	Torque / Nm	Temperature / °C	Torque / Nm	Temperature / °C	Torque / Nm	Temperature / °C
25	10	20	22	250	20	250
32	12		25		25	
45	14		28		28	

8.4.1.5 Standard Shot H101, H103, H104

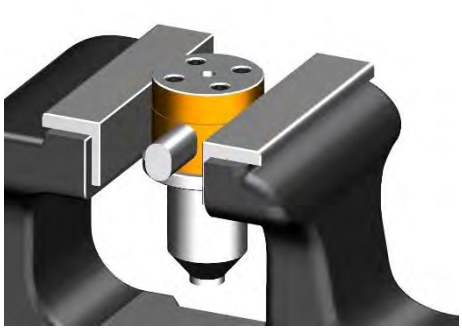

Figure 70: Clamping the Standard Shot

Clamp on the nozzle body

Use only soft jaws.

The inner part of the nozzle can only be replaced in its entirety in the event of wear, a defect or overfilling. To do this, heat the nozzle to the processing temperature of the plastic, remove the screws on the cover and remove the inside part.

Before inserting the new inner part in the nozzle, check that the conical sealing surfaces inside the housing and on the inside of the cover are clean and free from damage such as scratches. Only insert the inner part if this is the case.

Then put the cover on and fix it in position with the screws.

8.4.1.5.1 required tools

Table 18: Required tools and sizes: Maintenance Standard Shot

nozzle size	27	32	38	45	56
inbus	2,5	2,5	4	5	6

8.4.1.6 Multi Shot (H10325, H10425)

8.4.1.6.1 Clamping

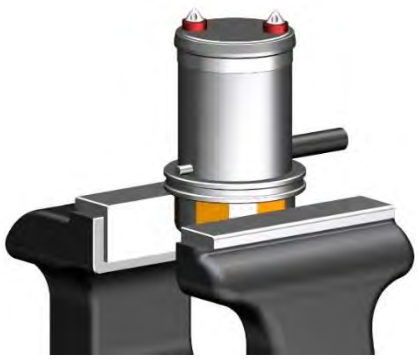

Figure 71: Clamping the Multi Shot

Only clamp on the spanner flats.

Permitted work:

- Cleaning
- Replacing nozzle tips
- Replacing MurSeal rings

The MurSeal rings must be replaced each time a nozzle is removed. Failure to do this can result in leakage.

8.4.1.6.2 required tools

Table 19: Required tools and sizes: Maintenance Multi Shot

Hex socket for torque wrench	8

8.4.1.6.3 Dismantling

1) Once the dismantling temperature has been reached, you should first remove the MurSeal® ring.

Pull the MurSeal® ring off the nozzle in a straight line. If the cap is rotated, this can lead to the tip coming off or cause damage to the nozzle tip.

2) Clean the plastic off the spanner flats on the nozzle tips.
3) The torpedoes can then be unscrewed.

8.4.1.6.4 Mounting

1) Apply spotting paste to the bottom of the torpedo.
2) You should then put the torpedo in place and screw it in hand-tight.
3) Open the torpedo again. Check whether the impression on the nozzle body is visible over the whole surface. Only continue if this is the case.
4) Clean all the parts with universal cleaning agent so that they are absolutely free of grease and spotting paste.
5) Put the torpedo in place again and heat the nozzle to the mounting temperature.
6) Once the mounting temperature has been reached, tighten the torpedo with the prescribed tightening torque.
7) Let the nozzle adjust for 5 minutes and then tighten it again.
8) Finally, put the MurSeal® rings on the torpedoes.

8.4.1.7 Multishot side gating (H10440)

8.4.1.7.1 Clamping

This nozzle requires a different procedure, since it has to be mounted and dismantled in the mould for the most part. The product video available in the internet under the title “HASCO H10440 Multi-Shot” provides clear assistance with this.

For dismantling the nozzle, it is essential to use dismantling tool H10441.

The required tightening torque for the position numbers in Figure 16 is set out in the following table:

Table 20: Tightening torques Multishot, side gating

Position	Tightening torque / Nm
5	65
6	65
15	6
16	10
20	70

8.4.1.7.2 Dismantling

1) The dismantling process starts in the mould. Undo the visible screws on the protective cover and remove them both.
2) Then undo the countersunk-head screws on the insulation sheet and remove these too.
3) The central hexagon screw can now be undone, and the clamp-on cover removed. If this is stuck, screws can be screwed evenly into the through-threads of the clamp-on cover and the cover lifted off in this way. Make sure that the cover does not become inclined.
4) Now undo the screws on a segment and insert the “fork” of the dismantling tool into the through-holes of the segment that is to be dismantled that have just come into view.
5) Then place the holder in the middle of the segments. The opening must be positioned next to the segment that is to be dismantled.
6) The washer with the sliding guide and the washer with the central hole is placed above it and fixed with the hexagon head screw.
7) Use a flat spanner on the hexagon of the sliding guide washer to turn the entire dismantling tool clockwise until the top of the fork comes to the end of the sliding guide.
8) After removing the dismantling tool, the segment, including the torpedo tip and the sleeve nut, can be removed.
9) Repeat the steps for dismantling the segments until all the segments have been removed.
10) Now remove the nozzle from the opposite of your mould.
11) Once you have removed and clamped the nozzle, unscrew the nozzle body.
12) Now pull the heater off the nozzle head.
13) Underneath this are two flat head screws that need to be undone completely before removing the thermocouple upwards, at an angle, from the groove.

8.4.1.7.3 Mounting

1) Once the nozzle head has been clamped, place the pre-bent thermocouple at an angle, from above, in the groove provided and secure it with the two flat head screws.
2) Feed the thermocouple cable through the heater and push it onto the nozzle head. The nozzle body can then be inserted and tightened. Use lubricant Z260 here.
3) Next, the mounted nozzle head is inserted into the mould with a dowel pin to prevent rotation and secured in place. The next steps are carried out from the parting plane side.
4) Apply spotting paste to the underneath of the torpedo.
5) Then put the torpedo in place and screw it in hand-tight.
6) Undo the torpedo again. Check whether the impression on the nozzle body is visible over the whole surface. Only continue if this is the case.
7) Insert the torpedo again and tighten the sleeve nut to a tightening torque of 6 Nm at room temperature.
8) Now put the feather spring in one of the segments and insert this into the nozzle head. Push the segment into the end position and fix it in place with the screws.
9) Once this is done for all the segments, put on the clamp-on cover and fasten it in place with the hexagon screw.
10) Then fix the insulating sheet in position with the countersunk head screws, put on the protective cover and secure it with the screws.

8.4.2 Maintenance and repair of hot runner blocks H4000 and H4010

As a general rule, maintenance work on the hot runner equipment should only be performed by HASCO. This applies particularly within the framework of the guarantee.

The following points should be borne in mind for the maintenance of hot runner blocks:

- Is material leaking at any point?
- Are the melt channels corroded or have they been chemically attacked?
- Does an electrical function test reveal any problems (current, insulation resistance, earthing)?
- Are the heater and thermocouple functioning improperly?
- Is the pretensioning still as indicated on the design drawing?
    - Does the frame plate thickness still comply with the design drawing?
    - Are the spacer discs deformed?
    - Have the spacer discs made any impressions on the surrounding plates?
- Is unusual soiling evident on the hot runner?
- Are cables damaged?

If at least one of the questions can be answered with “yes”, then at least the component concerned needs to be replaced or serviced. The following chapters list the work that you, as the system owner, are able to perform yourself.

If your system is still under guarantee and you replace or repair something on your hot runner yourself, this will invalidate any guarantee claims. This is why you should contact our Application Technology Department beforehand. They will inform you of the further action to be taken.

8.4.2.1 Cleaning the manifold block

HASCO offers a manifold cleaning service. Ask our Application Technology Department for more details on this.

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hotrunner@hasco.com

Before the manifold is mounted in the injection mould, the sealing surfaces for the nozzles must be checked. If they are damaged, the manifold may have to be ground down.

In this case, it will be essential to adjust the installation height appropriately. Failure to do so will most likely result in leakage.

8.4.2.2 Replacing a defective tubular heating element

To replace a tubular heating element, push the end of the tubular heating element away from the block. Then place an appropriate tool at the base of the groove and lift the tubular heating element out of the groove. We recommend using a flat but rigid brass tool that fits into the groove. If the bottom surface of the groove gets damaged despite using a soft metal tool, this must be reworked with fine abrasive paper.

The tubular heating element should be mounted from the middle. The H11381 has a mark showing the middle. The first 10 mm of the tubular heating element at the connection point must not be bent. The entire connection area, including the section that is not to be bent, must be outside the mould. To achieve an optimum heat transfer, it is essential to secure the tubular heating elements at least every 20 mm after they have been bent into the groove.

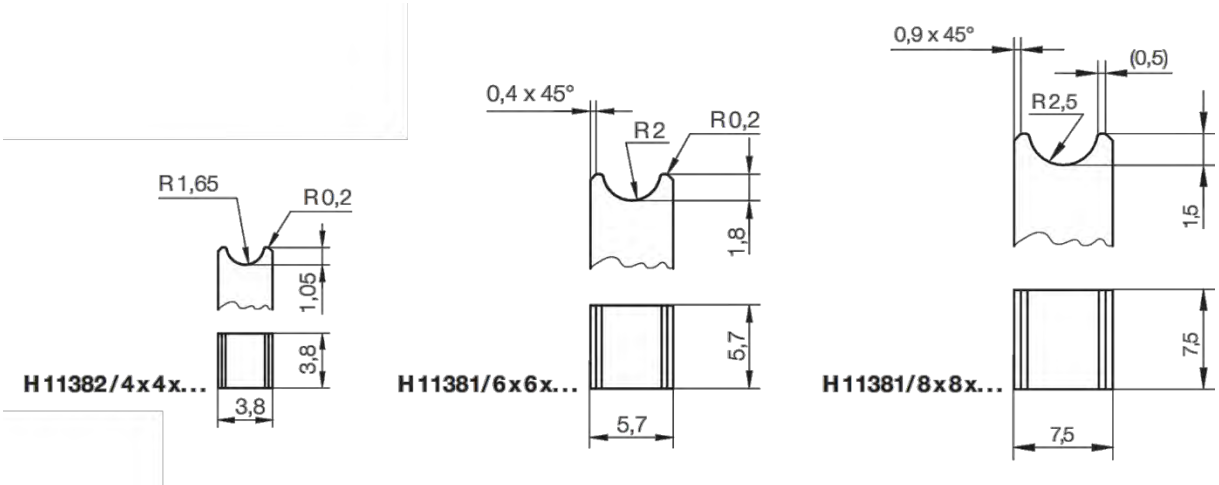


Figure 72: Insertion tool for tubular heating elements

The tubular heating element must also be secured from the middle outwards, in the same way as when it was mounted. The geometry of the tool used to drive it into position should correspond to the drawing to ensure it is optimally pressed in. Using a hammer, the tubular heating element should be inserted with hard blows at intervals of approximately 20 mm. Care must be taken to ensure perfect contact with the bottom of the groove. The groove in the tool should be parallel to the tubular heating element.

If the connection point protrudes from a plate by more than the specified amount, very high temperatures will develop at the connection point. There is then a risk of overheating and damage.

Once the tubular heating element has been wired up to the appropriate position in the plug again and an electrical test has been conducted, the heating is ready for use again.

The minimum bending radii must be observed to avoid damage to the tubular heating element.

Table 21: Minimum bending radii for the tubular heating element

Tubular heating element	Min. bending radius
H11382/4x4x…	10 mm
H11381/6x6x…	12 mm
H11381/8x8x…	14 mm

8.4.2.3 Replacing a defective thermocouple

Thermocouples that are attached to the manifold are normally of type H1295/1. The precise reference will be marked on the part. Undo the screw that fastens the thermocouple to the block and replace the thermocouple with a suitable, functioning thermocouple. Once the thermocouple has been wired up to the appropriate position in the plug again, and an electrical test has been conducted, the thermocouple is ready for use again.

8.4.2.4 Replacing a defective sprue bushing heater

If your sprue bushing heater fails, you can replace it by undoing the screws on the sprue bushing heater and pulling it off. You can then put the new heater in position and tighten the screws. Make sure that the outgoing cable is pointing in the right direction so that it fits into the recess provided for it in the mould. Once the sprue bushing heater has been wired up to the corresponding position in the plug again, and an electrical test has been conducted, your heater will be ready for use again.

8.4.2.5 Changing of the Sprue Bush

The sprue bushing may only be re placed when the hot runner has been removed from the mould. The hot runner must be firmly clamped to be able to apply the required torque. If the hot runner can be clamped in such a way that the sprue bush protrudes horizontally, it is easier to apply force. Make sure that neither nozzle seats nor other functional surfaces and parts can be damaged.

Apply at least the assembly torque listed in Table 21. Due to the alternating thermal stress, the dismantling torque required can also be higher.

Once the sprue bushing is removed, clean all sealing surfaces, apply spotting paste to the new sprue bushing and screw it in hand tight. Check the mating surface in the hot runner for even contact. proceed only when given.

Clean the mating surfaces and apply a high temperature ceramic release agent to the threads. Then mount the sprue bushing with the specified torque.

Table 22: Sprue bushings: mounting torques

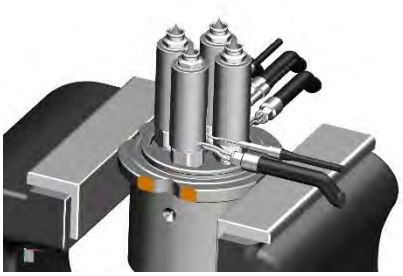
Thread on the sprue bushing	Tightening torque
M16x1.5	75 Nm
M24x1.5	200 Nm
M30x1.5	300 Nm
M34x1.5	350 Nm

8.4.3 Additional steps in the maintenance and repair of a hot runner block H4016

When removing an H4016 (or any other hot runner manifold with screw-in nozzles) from the cavity plate, it is essential to ensure that the block is heated to at least 100°C during removal.

8.4.4 Maintenance of Multimodules H4070 and H4175

8.4.4.1.1 Clamping



Clamp on the distributor body.

Also permitted without soft jaws.

Figure 73: Clamping the Multimodule

8.4.4.1.2 Dismantling

1) Remove the shrink tubing that keeps the thermocouple and the Multimodule heater together.
2) Open the jacket with suitable spreader pliers and pull it off towards the sprue bushing.
3) You can now pull off the heater and the brass sleeve.
4) Remove the thermocouple.
5) If you have an H4170, open the circlip on the sprue bushing and remove it. You can then remove the sprue bushing heater.
6) Clamp the body on the specified surface.
7) Dismantle the nozzles so that only the basic body of the nozzles remains screwed into the Multimodule (cf. Chapter 8.4.1.3.2).
8) You can now unscrew the nozzle body too.
9) Re-clamp the Multimodule and, finally, unscrew the sprue bushing.

8.4.4.1.3 Mounting

1) Clamp the body as intended, so that you can mount the sprue bushing.
2) Apply spotting paint to the sealing surface of the sprue bushing and screw it hand-tight into the body.
3) Unscrew the sprue bushing again and check whether the contact surface is uniformly covered with the paint. Only continue if this is the case.

4) Clean the sprue bushing and the body thoroughly with universal cleaner so that no spotting paste remains. Then thinly apply special lubricating grease A7002 to the thread of the nozzle body and screw the sprue bushing into the manifold.
5) Re-clamp the Multimodule so that you can mount the nozzles.
6) Apply spotting paste to the sealing surface of the first nozzle body and screw this into the body hand-tight.
7) Unscrew the nozzle body again and check whether the contact surface is uniformly covered in the paint. Only continue if this is the case.
8) Clean the nozzle and the body thoroughly with universal cleaner so that no spotting paste remains. Then apply aluminium paste to the thread on the nozzle body.
9) Tighten the nozzle body to 30 Nm at room temperature.
10) Repeat this process for all the other nozzles.
11) Insert the thermocouple into one of the four holes on the side of the Multimodule and bend it towards the nozzles. Make sure that the thermocouple is always at the front end of the hole.
12) Slide the sleeve over the body, fitting the thermocouple into the slot in the sleeve.
13) You can then push the heating coil over the sleeve, with the heater outlet positioned on the nozzle side.

If the heater outlet is not positioned above the thermocouple outlet to begin with, you can rotate the heater until they are lined up. The heater can only be rotated in one direction because it will be further tightened in the other direction.

14) Secure the thermocouple and heater outlet with shrink tubing and with a cable tie, to provide further strain relief.
15) Put the jacket in place, forcing it apart with suitable spreader pliers. The thermocouple and heater outlets should be inside the recess. Push the jacket onto the heating coil until it reaches the stop.
16) In the case of an H4170, you can now slide the sprue bushing heater into position and fix it with the circlip.
17) The nozzle is then mounted as per Chapter 8.4.1.3.4.

8.4.5 Maintenance of needle valves

The following points should be borne in mind for the maintenance of hot runner blocks with a needle valve system:

- Can material be seen emerging from the needle guide sleeve?
- Is wear evident on:
  - the needle in the region of the needle guide sleeve on the manifold?
  - the needle in the region of the needle guide sleeve in the nozzle?
  - the needle in the region of the gate?
  - on the mould insert in the region of the gate?
  - the piston?
  - the running surface of the piston?
- Does a tightness test reveal any leakage?

If at least one of the questions can be answered with “yes”, then at least the component concerned needs to be replaced or serviced. The following chapters list the work that you, as the system owner, can perform yourself.

It is recommended that the O-rings be replaced at all events. HASCO supplies a repair kit for the needle valve in your particular product. Contact our Application Technology Department who will send you the right kit.

8.4.5.1 Replacing the needle guide sleeve H107930

You can remove the old needle guide sleeve using an appropriate tool. A torque wrench is required to install it. Each needle guide sleeve is to be tightened to 35 Nm. An exception is the H107930/2x7x20, which must be tightened to 25 Nm.

8.4.5.2 Replacing the needle guide sleeve in the nozzle

Information on mounting and removing your nozzle may be found in Chapter 8.4.1.

8.4.5.3 Replacing the needle

Information on the structure of the needle valve and on installing the needle may be found in Chapter 6.3.2.

Removal is performed in the same way as in Figure 49.

In the case of plate control, the installation steps must be performed in the reverse order so as to dismantle the system and release the needles.

8.4.6 Special maintenance steps for wired systems and hot halves

Additional points that arise with hot halves and wired systems include the electrical connections and guide elements:

- Are the electrical connections worn or in a poor state in general?
- For hot halves, is wear visible on the guide elements?

If at least one of the questions can be answered with “yes”, then at least the component concerned needs to be replaced or serviced. The following chapters list the work that you, as the system owner, are able to perform yourself.

8.4.6.1 Replacing the electrical connections

This work may only be carried out by a qualified electrician.

8.4.6.2 Replacing the guiding elements

To replace the guiding elements, the hot half must normally be dismantled down as far as the nozzle holding plate. This dismantling operation will differ as a function of the structure of your hot half. First read Chapter 6.3 and if you have any questions please contact our Application Technology Department.

8.5 Information regarding repairs at HASCO

Work that is not listed in these operating instructions and work on hot runner products that are still within the guarantee period and which would violate the conditions of this guarantee must always be performed by HASCO, unless otherwise stated.

In order to clarify the circumstances and keep the downtime to a minimum, please contact our Application Technology Department before sending in your product. They will provide you with the necessary information for shipping your hot runner product.

Please note that the quotation for the repair work can only be compiled after we have received the components.

8.5.1 Correct packing and shipping

The defective hot runner equipment must generally be packed in the same way as it was originally sent to you. Table 23 sets out the details of the packaging.

You should also consult Chapter 9.3: Corrosion protection.

9 Storage

Hot runner systems can react to environmental influences. Particular care must be taken with moisture and hence corrosion protection. Special measures are thus required for transport and storage too.

9.1 Safety instructions

9.2 Correct storage

The following points must be observed:

- Store in a closed room without exposure to environmental influences.
- No corrosive, damp or dusty environments.
- Air-conditioned storage (25°C±10°C, rel. humidity max. 60%).
- Mechanical stress of all kinds to be avoided.

Only store the system in suitable locations. If the product is stored on a shelf, for example, the permitted load-bearing capacity of the shelf should be compared with the overall weight stated on the delivery notice. If the overall weight exceeds the permitted load, you must not store your product there.

9.3 Corrosion protection

Conscientious cleaning of the system to remove dirt, material residues and condensation is particularly important. The mould cooling system must also be dry.

After applying protection spray, seal the hot runner system in a polyethylene bag. Additional corrosion protection for the duration of storage can be achieved by adding a moisture-absorbing silicate.

Cleaning and corrosion-protection sprays can cause headaches, dizziness and nausea. Ensure there is sufficient ventilation and wear appropriate protective clothing – possibly even a respiratory protective mask. The instructions for use are supplied by the respective manufacturers. We recommend working under an extraction hood.

9.4 Transport over long distances

If HASCO hot runner equipment is to be transported over long distances, the same rules as in Chapter 8.5.1 must be observed. Make sure that the load is suitably and correctly secured. This applies both to securing the product in the packaging and securing the packaging in the means of transport.

The following table shows you what type of packaging should be used:

Table 23: Packaging instructions

System	Dimensions / weight	Shipping state
H4000, H4010, H4016	<70 kg and <45x40x20 cm	Robust cardboard, hot runner protected with foam and separating foil between the foam and the hot runner system
H4000, H4010, H4016	>70 kg or dimensions in excess of 45x40x20 cm	Robust wooden crate on a pallet, hot runner protected with foam and separating foil between the foam and the hot runner system
H4400	<100 kg	Robust wooden crate on a pallet, position on the base fixed with screwed-on wooden blocks and lashing straps affixed to the pallet and around the part
H4400	>100 kg	Robust wooden crate on a pallet and the hot half fixed in the box by means of screwed-on wooden slats.

9.5 Long-term storage

Prior to putting the part into long-term storage, it must be cleaned and have preservation agents applied to it.

Check the system and all moving components for damage and repair these where necessary.

We recommend long-term preservation and storage on a pallet in an air-conditioned location. Regular inspection and, where necessary, renewal of the protective layer and packaging are essential during long-term storage.

The instructions set out in Chapter 7.3: Renewed start-up should be followed when bringing the system into operation again.

10 Disposal

10.1 Safety instructions

10.2 Disposing of the hot runner system

You should observe the local and national regulations governing environmental protection, disposal and related topics.

Prior to disposal, all the connections (electric, hydraulic, water and pneumatic) must be disconnected from the hot runner equipment.

Drain the hydraulic and water circuits and make sure that no hydraulic fluid and no lubricants remain in or on the hot runner equipment.

Dispose of these fluids and lubricants in the correct manner.

Remove all the electric components and send these for the appropriate form of recycling.

Remove any plastic from the hot runner system, by burning it out if necessary. All the metal can then be sent for recycling as scrap metal.

HASCO assumes no responsibility for recycled parts that are not used for their original purpose.

Annex

A-1. Recognising and rectifying process errors

The production of plastic articles is a complex process and can give rise to complex processing and/or production difficulties which, in the worst case, can lead to a production stoppage. Frequently, several factors are involved, making a systematic analysis necessary. The errors can be so varied that a comprehensive and complete description of the procedure cannot be given at this point. To nonetheless provide you with the best possible support, we have summarised frequently occurring error patterns and their origins below, together with possible means of eliminating them.

Please note that these are only indications and possible causes of errors. In case of doubt, our Application Technology Department will be pleased to assist you.

A-1.1. Errors due to the control equipment

Error	Problem	Potential action
Selected setpoint temperature is not attained	Heat loss through excessively large or unwanted contact surfaces	Check mounting space
	Problem with the wiring, see on this Figure 74 to Figure 79	Check the wiring again
	Problem with the control equipment	Connect to a different controller by way of a test
	Defective components	Check the heaters and thermocouples
Selected actual temperature fluctuates or is not attained	Thermocouple defective	Check the thermocouple resistance
	Problem with the controller	Connect to a different controller by way of a test
	The thermocouple is not correctly positioned	Check the position of the thermocouple
	Heat loss through excessively large or unwanted contact surfaces	Check mounting space

Error	Problem	Potential action
The nozzles reached the selected setpoint a long time ago, but the hot runner block is taking a long time to heat up. Boiling plastic is emerging from the nozzle / excessive smoke formation.	Nozzle heats up too fast	Use the “standby” function on the HASCO controller and reduce the setpoint temperature of the nozzles until the block is ready for use.
		Heat up the hot runner system in a group.
		Dismantle the mould, performing a fault analysis and cleaning it if necessary.
The power consumption of the nozzles increases continuously (over a period of up to several days)	Leaking	Dismantle the mould, performing a fault analysis and clean it.

Figure 74: Unprofessional wiring

Figure 75: Defective / severed thermocouple element

Figure 76: Squeezed heater cable

Figure 77: Defective / squeezed thermocouple element

Figure 78: Torn-off heater cables, too small a bending radius

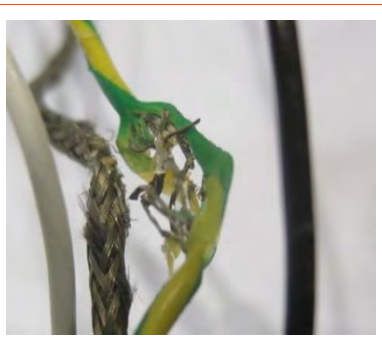


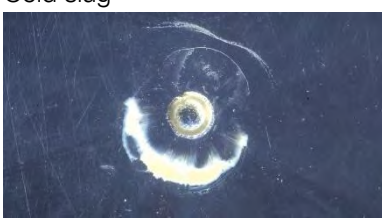
Figure 79: Defective earthing cable

A-1.2. Temperature-conditioned error causes

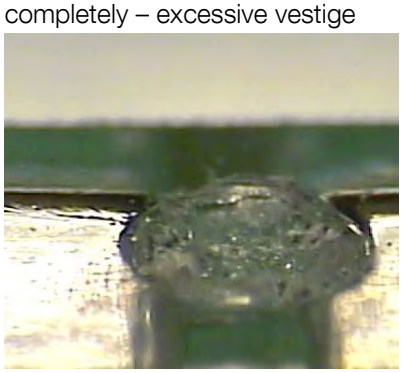
Error	Problem	Potential action
Poor gate quality  Figure 80: Poor gate quality	Tip incorrectly positioned	Check installation configuration and correct, if necessary
	Sprue bore damaged	Check the gate bore and rework if necessary
	Cylindrical land too high	Reduce the cylindrical land, readjust nozzle geometry if necessary
	Tip is worn	Check torpedo for wear and replace if necessary
Nozzle is drooling	Nozzle temperature too high	Adjust process temperature
	Contact surface with mould too small	Check installation situation and correct if necessary
	Thermocouple or heater defective	Check the thermocouple and heater
	Decompression too low	Increase the decompression
	Temperature control close to the gate is insufficient	Check the mould wall temperature and reduce if necessary
Dissimilar opening performance of the nozzles / dissimilar moulded part filling	Cold slug	Adjust the nozzle temperatures
	Gate too big	Check the gate diameter and tip
	Questionable temperature control	Connect to a different controller by way of a test
	Thermocouple defective	Check thermocouple and replace if necessary
Gate freezes	Gate too small	Check installation space and rework if necessary
	Nozzle tip is too far back	Check tip position and rework if necessary
	Contact surface between the nozzle and mould wall too big	Possibly rework the contact surfaces
	Thermocouple or heater defective	Check thermocouple and heater and replace if necessary
	Drooling from previous cycle	See “Nozzle is drooling”

A-1.3. Poor article quality

Error	Problem	Potential action
Matt areas around the gating point  Figure 81: Dull areas around the gating point (Kunststoff-Institut Lüdenscheid K.I.M.W. NRW GmbH, 2013)	Gate too small	Increase the size of the gate
	Injection speed too high	Reduce the injection speed
	Temperature gradient in the mould	Vary the temperatures
Burn streaks  Figure 82: Burn streaks (Kunststoff-Institut Lüdenscheid K.I.M.W. NRW GmbH, 2013)	Temperature too high	Reduce process temperatures and clean hot runner system
	High shear	Reduce injection speed and clean hot runner system
	Excessively long dwell time	Clean the hot runner system
Jetting  Figure 83: Jetting (Kunststoff-Institut Lüdenscheid K.I.M.W. NRW GmbH, 2013)	Unfavourable gate position for the part geometry	Modify the injection profile (start slowly then increase)
		Move the gate
		Modify the article geometry

Error	Problem	Potential action
Insufficiently filled parts	Venting problem	Check the venting and modify if necessary
	Injection speed too low	Increase injection speed
	Melt or mould temperature too low	Increase process temperatures
Cold slug  Figure 84: Cold slug at the gating point (Kunststoff-Institut Lüdenscheid K.I.M.W. NRW GmbH, 2013)	Cooled melt in the gate	Increase the nozzle temperature
	Incorrect torpedo	Check torpedo and replace if necessary
	Tip is worn	
	Tip incorrectly positioned	Check installation configuration and correct, if necessary
Stringing	Gate and areas of the moulding not yet solidified	Increase cooling time
		Reduce process temperature
		Increase holding time
Dark spots  Figure 85: Dark spots in the part	Thermal damage due to exceeding the dwell time or excessively high process temperatures	Clean the hot runner system and check the dwell time and temperature settings and adjust where necessary
Finely grooved surface  Figure 86: Finely grooved surface (Kunststoff-Institut Lüdenscheid K.I.M.W. NRW GmbH, 2013)	Injection speed, melt temperature or mould temperature too low	Systematically vary the parameters

A-1.4. Mechanical error causes

Error	Problem	Potential action
Needle valve piston does not move	Air in the hydraulic system	Vent the hydraulic system
	Piston seals defective See Figure 90	Check seals and replace if necessary
	Supply and exhaust air switched	Check air connections
	Insufficient pressure	Possibly replace the compressor
	Piston misaligned, foreign material in the system	Check the piston
	Polymer not plastic enough	Check the temperature of the hot runner system
Needle valve does not close completely – excessive vestige  Figure 87: Excessive tear-off	Incorrect switchover point	Adjust switchover point
	Holding pressure time too long	Minimise holding pressure time
Leakage – free space in nozzle full of plastic  Figure 88: Leakage via nozzle fit	Installation space not in compliance with specification See Figure 91 and Figure 92	Check installation space and rework if necessary
	Part defective / worn	Fault analysis incl. cleaning recommended at HASCO
	Nozzle melt chamber in contact with the ejector side See Figure 93	Avoid contact – A disc must be injected as well

Error	Problem	Potential action
Leakage – hot runner system flooded with plastic  Figure 89: Hot runner covered in plastic	Installation space not in compliance with specification	Check the installation space, in particular the frame plate thickness and supporting surfaces
	Part defective / worn	Fault analysis incl. cleaning recommended at HASCO
Leakage near the machine nozzle	Nozzle radius not aligned See Figure 94	Rework
	Sealing surface damaged See Figure 95	Rework

A-1.5. Further errors


Figure 90: Piston seal defective


Figure 91: Incorrect height adjusting – hot runner covered in plastic


Figure 92: Incorrect height adjusting – insufficient preload

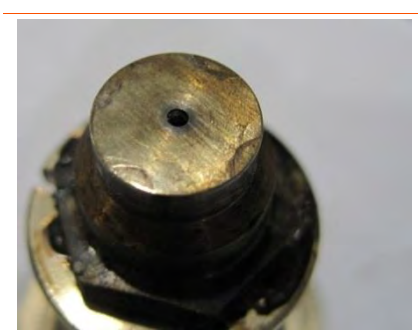


Figure 93: Leakage due to contact of the nozzle melt chamber

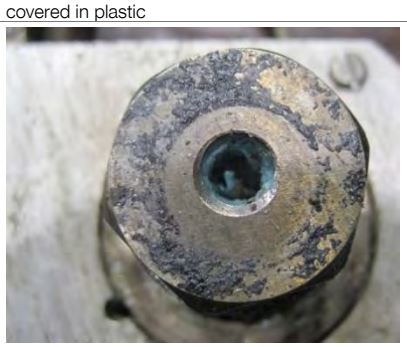


Figure 94: Nozzle contact radius not aligned, leakage possible


Figure 95: Damaged sealing surface on the contact radius, leakage possible

A-2. Instructed personnel

The persons listed on this page confirm with their signature that they have read and understood Chapter 2: Safety provisions and the safety instructions and warnings in these operating instructions that relate to the work entered on this page. At the same time, you confirm that you have been carefully and comprehensively instructed in the work to be carried out by an authorised member of staff.

Full name	Person is authorised to carry out the following work:	Instruction was provided by	Date	Signature of the instructed person

A-3. [1] Declaration of comformity

[2] No.: HR_2020-04

[3] This declaration of conformity is issued under the sole responsibility of:

[4a] Company:	HASCO Hasenclever GmbH + Co KG
[4b] Address:	Römerweg 4 D-58467 Lüdenscheid
[4c] Phone:	+43 2236 202-500
[4d] EMail:	hotrunner@hasco.com

[5] Object of declaration:

	[8] References to the relevant harmonised standards used or references to the specifications in relation to which conformity is declared: [9] Reference of the standard								
[6a] model / type number:	DIN EN 60204-1 18.2.2 DIN EN 60204-1 18.3 DIN EN 60204-1 18.6	DIN VDE 0701-0702: Differenzstrommessung	EN 60204-1	EN 61000-6-1	DIN EN 60335 Teil 3	EN 60519-1:2015	EN 55011:2009	VDE 0700 Teil 1	VDE 0100
H4400, H44201, H44202, H4015, H4016	●	●							
H4000, H4010, H4070, H4075, H4170, H4175, H2010, H2020	●	●							
H61…, H65…			●*	●**	●**	●**	●**		
H62…			●	●**	●**	●**	●**		
H63…								●	●
H3320…, H3340…, H3420…, H3440…				●***	●	●***	●***		
H202xx					●				

*) Size 25 and 40
**) Size 32 and 50
***) except Size 20

[10] Name and address of the person authorised to compile the technical file:

Sebastian Hohenauer, Productmanager — [11a] (Name, Function)
Industriestraße 21 A-2353 Guntramsdorf — [11b] (Address)

Lüdenscheid, 2022-01-27
[12] (Ort und Datum der Ausstellung)

ppa
HASCO
Hasenclever GmbH + Co KG
Römerweg 4
58513 Lüdenscheid
Germany

Florian Larisch
Executive Vice President Hot Runner Division
[11a] (Name, Function)
[11c] (Signature)

DE

1)	Konformitätserklärung			2)	No.		
3)	Die alleinige Verantwortung für die Ausstellung dieser Konformitätsbestätigung trägt:						
4a)	Firma	4b)	Anschrift	4c)	Telefon	4d)	E-Mail
5)	Gegenstand der Erklärung	6a)	Modell- / Typennummer				
7)							
8)	Angabe der einschlägigen harmonisierten Normen, die zugrunde gelegt wurden, oder Angabe der Spezifikationen, für die die Konformität erklärt wird:						
9)	Bezugsnummer der Norm	10)	Name und Anschrift der Person, die bevollmächtigt ist, die technischen Unterlagen zusammenzustellen				
11a)	(Name, Funktion)	11b)	(Adresse)	11c)	(Unterschrift)	12)	Ort und Datum der Ausstellung

FR

1)	DÉCLARATION » DE CONFORMITÉ			2)	No		
3)	La présente déclaration de conformité est établie sous la seule responsabilité du:						
4a)	entreprise	4b)	adresse	4c)	téléphone	4d)	e-mail
5)	Objet de la déclaration	6a)	modèle, type				
7)							
8)	Références des normes harmonisées pertinentes appliquées ou des spécifications par rapport auxquelles la conformité est déclarée:						
9)	Référence de la norme	10)	Le nom et l'adresse de la personne autorisée à constituer le dossier technique:				
11a)	(nom, function)	11b)	(adresse)	11c)	(signature)	12)	date et lieu d'établissement

IT

1)	DICHIARAZIONE DI CONFORMITÀ			2)	N.		
3)	La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del:						
4a)	azienda	4b)	indirizzo	4c)	telefono	4d)	e-mail
5)	Oggetto della dichiarazione	6a)	modello, tipo				
7)							
8)	Riferimenti alle pertinenti norme armonizzate utilizzate o alle specifiche in relazione alle quali è dichiarata la conformità:						
9)	Riferimento della norma	10)	Nome e indirizzo della persona autorizzata a costituire il fascicolo tecnico:				
11a)	(nome e cognome, funzione)	11b)	(indirizzo)	11c)	(firma)	12)	luogo e data del rilascio

ES

1)	DECLARACIÓN DE CONFORMIDAD			2)	No		
3)	La presente declaración de conformidad se expide bajo la exclusiva responsabilidad del:						
4a)	compañía	4b)	dirección	4c)	teléfono	4d)	email
5)	Objeto de la declaración	6a)	modelo, tipo				
7)							
8)	Referencias a las normas armonizadas pertinentes utilizadas, o referencias a las especificaciones respecto a las cuales se declara la conformidad:						
9)	Referencia de la norma	10)	Nombre y dirección de la persona facultada para elaborar el expediente técnico:				
11a)	(nombre, cargo)	11b)	(dirección)	11c)	(firma)	12)	lugar y fecha de expedición

PT

1)	DECLARAÇÃO DE CONFORMIDADE			2)	N.o		
3)	A presente declaração de conformidade é emitida sob a exclusiva responsabilidade do:						
4a)	firma	4b)	endereço	4c)	telefone	4d)	e-mail
5)	Objecto da declaração	6a)	modelo, tipo				
7)							
8)	Referências às normas harmonizadas aplicáveis utilizadas ou às especificações em relação às quais é declarada a conformidade:						
9)	Referência da norma	10)	Nome e endereço da pessoa autorizada a compilar o processo técnico:				
11a)	(nome, cargo)	11b)	(endereço)	11c)	(assinatura)	12)	local e data da emissão

PL

1)	DEKLARACJA ZGODNOŚCI			2)	Nie.		
3)	Wyłączna odpowiedzialność za wydanie tej deklaracji zgodności						
4a)	Firma	4b)	Adres	4c)	Telefon	4d)	E-mail
5)	Przedmiot deklaracji	6a)	numer modelu / typu				
7)							
8)	Odniesienia do odpowiednich zastosowanych norm zharmonizowanych lub odniesień do specyfikacji, w odniesieniu do których deklarowana jest zgodność:						
9)	Odniesienie do normy	10)	Nazwa i adres osoby upoważnionej do opracowania dokumentacji technicznej:				
11a)	(Nazwa, funkcja)	11b)	(Adres)	11c)	(Podpis)	12)	Miejsce i data wydania

NL

1)	VERKLARING VAN OVEREENSTEMMING			2)	Nee.		
3)	Deze conformiteitsverklaring wordt uitgegeven onder de uitsluitende verantwoordelijkheid van:						
4a)	Bedrijf	4b)	Adres	4c)	Telefoon	4d)	E-mail
5)	Object van de verklaring	6a)	model- / typenummer				
7)	3						
8)	Verwijzingen naar de relevante geharmoniseerde normen die zijn gebruikt of verwijzingen naar de specificaties in verband waarmee de conformiteit is aangegeven:						
9)	Referentie van de norm	10)	Naam en adres van de persoon die bevoegd is om het technisch dossier samen te stellen:				
11a)	(Naam, functie)	11b)	(Adres)	11c)	(Handtekening)	12)	Plaats en datum van het probleem

Da ein vollständiger Personenschutz bzw. eine vollständige Gerätesicherheit durch den fach- und sachgerechten Einbau in das Endgerät sowie dessen zweckgemäße Verwendung mitbestimmt wird, ist unsere Haftung diesbezüglich eingeschränkt.

Die angeführten Produkte von HASCO hot runner erfüllen nicht die Definition eines fertigen Gerätes, daher können seitens HASCO auch keine EG-Konformitätserklärungen laut 2011/65/EU, (EU) 2015/863, oder 2014/35/EU ausgestellt werden. Die Produkte fallen ebenfalls nicht in den Geltungsbereich der Richtlinien 2014/30/EU und 2006/42/EG.

As personnel safety and correct functioning of the product is contingent on profession and appropriate installation in the target equipment as well as its intended use, our liability in this regard is limited.

The listed products from HASCO hot runner do not meet the definition of a finished device, which is why HASCO cannot issue any EC declarations of conformity according to 2011/65 / EU, (EU) 2015/863, or 2014/35 / EU. The products also do not fall within the scope of the 2014/30 / EU and 2006/42 / EC directives.

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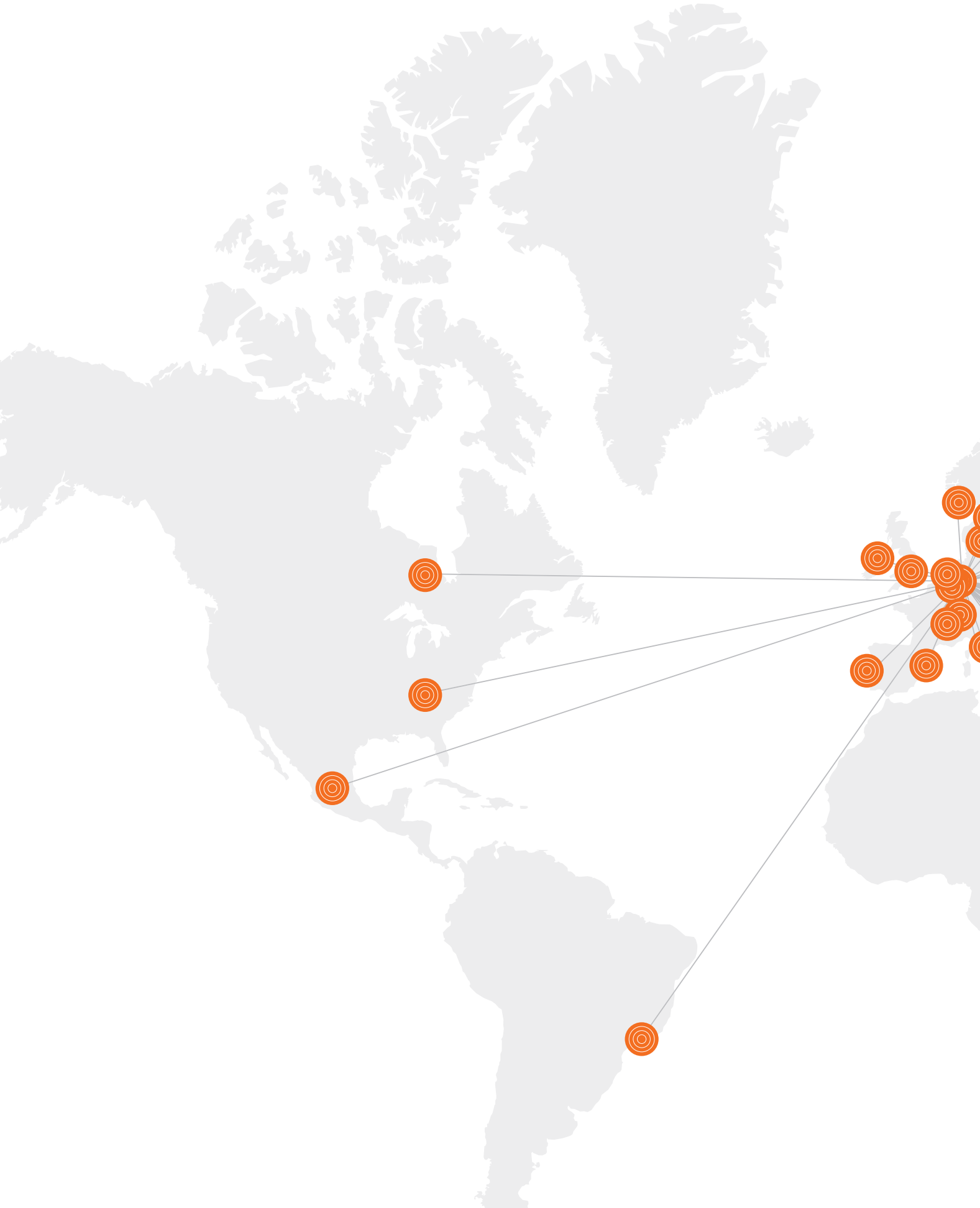

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