

# **GH / ZP**

# **Melt Spinning Pump**



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## Melt Spinning Pump

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# 1 Translation of the Original Operating Instruction

## 1.1 Safety

### 1.1.1 Notes for the Operating Company

Read these operating instructions before commissioning the pump.

### 1.1.2 Safe Operation Instructions of the Operating Company

As employer you are obliged to draw up safe operation instructions for your company.

This applies especially when components, such as pumps / pump units, are supplied for a line / machine and the supplied operating instructions are component specific. The following sections should facilitate the production of your own safe operation instructions.

In addition, you can order a service book for any type of pump from Barmag. Barmag also supplies training for service activities.

### 1.1.3 Intended Use

The melt spinning pump is intended for metering liquid media (usually polymer melts).

**Operate the pump only within the limits designated in the pump data sheet (see [Section 1.2.1: "Pump data sheet"](#)).**

For safety reasons, no other or additional use is allowed. Any other use may lead to increased risks for the operating personnel.

Intended use includes observance of the Operating Instructions, especially of the repair instructions.

### 1.1.4 Qualifications of Personnel

Use only trained personnel for commissioning, operating, and maintenance of the pump / pump unit.

### 1.1.5 Notes on Commissioning

After completing the installation and before each recommissioning of the pump/ pump unit, you must carry out a **test run including a check of the process parameters and all safety devices**.

### 1.1.6 Operation and maintenance

Do not change or convert the pump / pump unit without the express approval of Barmag. Failure to do so makes the entire warranty null and void.

Inspection, maintenance, and repair activities may only be carried out by trained personnel.

Production-related changes on the external pump surfaces (e. g. by attaching fastening devices on the processing machine or the heat treatment plants) have no negative effects on the quality and are therefore no reason for complaint.

Differences in color of the metallic pump components due to the heat treatment process also have no negative effects on the quality and are no reason for claims.

Use Barmag auxiliary devices for professional maintenance and repairs. Order the corresponding catalogs.

Use only original Barmag parts.

### 1.1.7 Notation, signs, symbols etc. in the Operating Instructions

#### Explanation of symbols

These Operating Instructions include the following symbols, signal words and references:



#### **⚠ WARNING**

##### **Signal word "Warning": Warning - Risk of personal injury!**

This symbol is meant to draw the attention of the operator to the safety instructions in the Operating Manual. It points out working steps which might pose a serious risk to the health and safety of **persons**. Always pay regard to and follow these instructions in order to avoid accidents.

- ▶ Symbol for actions required and demanded.
- ⊘ Symbol for prohibited actions to be refrained from.



#### **⚠ CAUTION**

##### **Signal word "Caution": Caution - Risk of personal injury!**

This symbol is meant to draw the attention of the operator to the safety instructions in the Operating Manual. It points out working steps which might jeopardize health and safety of persons. Always pay regard to and follow these instructions in order to avoid accidents.

- ▶ Symbol for actions required and demanded.
- ⊘ Symbol for prohibited actions to be refrained from.

#### **NOTE**

##### **Signal word "Note": Warning - Risk of material damage.**

This sign refers to general information meant to allow for the proper and efficient operation of the system / machine.

### 1.1.8 Safety Instructions

**The safety instructions are intended for anyone involved with the pump within the scope of installation, commissioning, operating and maintenance activities.**

Carefully read the operating instructions formulated by your company and observe the following safety instructions and clarifications.

- Use the required personal protective devices (such **as safety glasses, safety gloves and safety clothes.**)
- Do not allow unauthorized persons access to the installation/machine.
- The safety data sheets of pumping media and other chemical substances are to be observed!
- Be careful when handling the pump because of
  - high temperatures
  - hot pumping media and gases
  - rotating parts

Wear suitable working and protective clothes!

- If work is to be carried out on the system's spinning pumps, wear appropriate clothes for protection against high temperature and probably outflowing hot pumping media.
- Do not remove any protective covers of driving parts or other components.
- Before beginning repair and service work on the pump, the pump drive must be electrically switched off and allowed to run down to standstill.

**Observe switch-off regulations!**

**Secure the switched off drive against unauthorized restart.**

### 1.1.9 Installation / Machine Specific Safety Instructions



#### **⚠ WARNING**

##### **Leakage of liquid und pressure!**

The pump's functionality may lead to pressures at the inlet and the outlet of the pump which may damage the pump and/or the line and pose a risk to persons.

- ▶ It must therefore be ensured that the max. permissible pressures at the pump inlet and outlet are not exceeded. The allowed pressures are specified in the pump's data sheet (see [Section 1.2.1, "Pump data sheet"](#)).



**⚠ WARNING**

**Leakage of liquid und pressure!**

Pump components may be damaged or destroyed due to improper operation or incorrect handling of the pump. Thus, it is possible that the drive shaft is pushed out of the pump as long as the pump is pressurized. In this case, hot liquid may be ejected.

- ▶ Therefore, it is only allowed to work on the pump or in the area around the pump if the pump is unpressurized.
- ▶ The shaft between gear motor and pump may only be removed if the pump is unpressurized.
- ▶ Cardan shafts providing a lockable displacement in length have a retaining nut that must always be tightened while the pump is pressurized.
- ▶ Protective covers may only be removed after the pump has been depressurized.
- ▶ Wear protective clothing, especially a face shield!



**⚠ CAUTION**

**Risk of splintering due to breakage!**

An excessive driving torque may cause the drive shaft to break

- ▶ Observe the max. allowed driving torque (see [Section 1.2.1, "Pump data sheet"](#)).
- ▶ Therefore an adequate safety device - such as an overload coupling - must be installed (max. allowed driving torque see [Section 1.2.1, "Pump data sheet"](#)).
- ▶ The pump is lubricated by the medium pump. DO NOT allow the pump to run dry!
- ▶ Do not remove any protective covers of rotating parts during operation.



**⚠ CAUTION**

**Risk due to exposure to material and substances!**

The values specified in the pump data sheet (see [Section 1.2.1, "Pump data sheet"](#)) are related to the mechanical rigidity of the pump.

- ▶ The operating party is therefore required to carry out suitable tests on the pump media (flushing and sealing media, if required) to establish the allowed operating values and ensure that neither the media themselves nor the media-specific operating conditions produce any risks.
- ▶ The pumping media used must not chemically attack the pump materials. Please contact Barmag, if required.
- ▶ Observe the safety data sheets of the pumping media without fail.



**NOTE**

- ▶ Note position and diameter of the inlets and outlets as specified in the pump drawing (see [Section 1.2.2, "Pump Drawing"](#))

## **1.2 Machine Layout / Marking**

### **1.2.1 Pump data sheet**

The pump data sheet is supplied together with these Operating Instructions.

### **1.2.2 Pump Drawing**

The pump data sheet is supplied together with these Operating Instructions.

### **1.2.3 Designations**

Engraved characteristics:

- Number of pump
- Flow rate
- "Barmag"

## 1.3 Assembly / Disassembly








### 1.3.1 Designation of Packing

The machines or machine parts are supplied in stable packages.

The packages have been labeled with letters and identification symbols that comply with international symbol standards. Observe these labels for the regular handling and transportation of the packed machine parts.

#### Label definition

- Order No.
- Weight (gross)
- Addressee

Identification symbols used:		
Meaning	Color	Symbol
Upper end	black	
Fragile	black	
Protect against dampness	black	
Center of gravity	black	
Attach lifting equipment here	black	
Sealed packing	black	
<b>Do not pick up</b> with forklift at this point	black	

### 1.3.2 Safe transport of pumps



#### ⚠ CAUTION

##### **Danger of crushing!**

Observe weight specifications of the pump (see [Section 1.2.1, "Pump data sheet"](#) or see [Section 1.2.2, "Pump Drawing"](#)).

- ▶ Heavy loads may be handled by transport professionals only.

#### ⚠ WARNING

##### **Risk of burns!**

During the transport of hot pumps, hot pump media may drip.

- ▶ Wear suitable protective clothing.

### 1.3.3 Transport Assist



#### ⚠ CAUTION

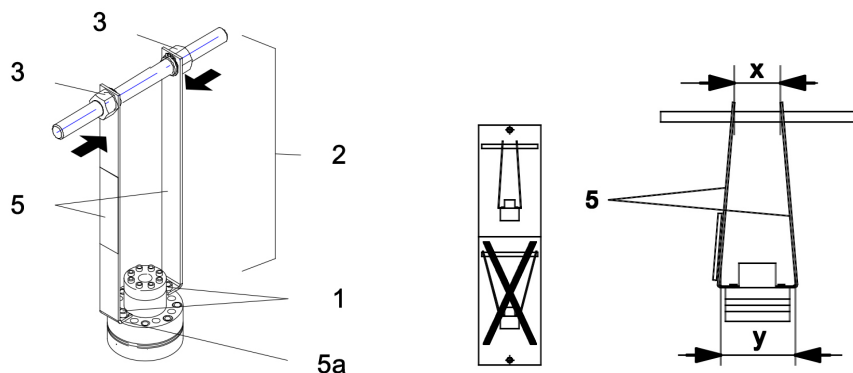
##### **Risk of crushing and risk of burns!**

- ▶ The contact surfaces of pump and transport assist must be clean!
- ▶ In order to prevent the pump from slipping out of the transport assist, the straps (5) of the assist must always be adjusted in such a way that distance  $x$  is at least 20 mm shorter than distance  $y$ .
- ⊘ Do not use the transport-assist in connection with a hoist.

If the pumps are provided with transport screws (1) the transport assist (2) can be used.

Push the appropriate recesses of both straps (5a) und the heads of the transport screws (1).

By turning both nuts (3), the transport assist can be adapted to the respective pump.



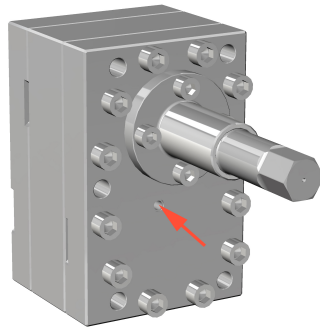
### 1.3.4 Transport thread



#### ⚠ CAUTION

#### Risk of crushing and risk of burns!

- ▶ Only use appropriate transport screws together with the provided transport threads!



### 1.3.5 Assembly in a line

- At the time of delivery, inlet and outlet holes as well clutch sealing (if present) will be sealed with protective plugs in order to prevent contaminations from entering the pump. Remove the protective plugs / caps immediately before installing the pumped into the installation / machine or before heating it in the oven. Keep the protective plugs for reuse during any future disassembly.
- Be careful when transporting and assembling the pump.
- Before the pump is installed into the installation / machine, ensure that all parts that contact the product ahead of the pump are absolutely clean. Contamination, metal particles, etc. lead to pump damage.
- The clamping surface for the pump must be even. The surface must remain even while the line is at operating temperature.  
Please refer too the table below for the maximum unevenness allowed for the mounting surface.

Pump type:	Maximum unevenness allowed for the mounting surface
Planetary gear pumps up to 120 mm in diameter	4 µm
Planetary gear pumps of > 120 mm in diameter	6 µm
Rectangular pumps of a discharge rate of up to 5cm <sup>3</sup> /rev.	4 µm
Rectangular pumps of a discharge rate of > 5cm <sup>3</sup> /rev.	6 µm

The clamping surface must be finished by lapping (surface roughness  $3 \leq 1 \mu\text{m}$ ).

The contact surfaces of the pump and the clamping surface must be absolutely clean and undamaged (no burrs or nicks).

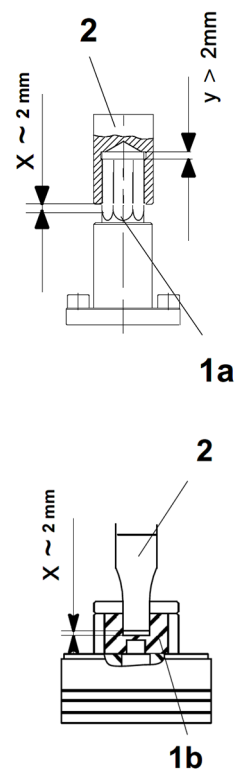
The slightest soiling (melt residues, insulating material, etc.) and damage lead to a leakage between the pump and the clamping surface

- For preheating the pump, see [Section 1.4.2, "Preheating of the Melt Spinning Pump"](#)
- Apply a thin coat of high-temperature metal paste "Klüber Unimoly HTC Metallic" to the threads and head contact surfaces of the pump fastening screws.
- On screwing-in of the screws take care that no grease reaches the clamping surface of the spinning head below the screw-down surface of the pump.
- The fastening screws of the pump are to be tightened gradually and crosswise. On every step the tightening torque is to be increased by approx. 30 Nm until reaching the required tightening torque (see [Section 1.2.2, "Pump Drawing"](#)). After each step the ease of pump rotation must be checked.

- The pump drive shaft (1a) or the coupling (1b) must be in exact alignment with the shaft of the spinning pump drive (2).  
Pumps with polymer-seal or stuffing-box sealing are to be driven, in any case, by a double-joint cardan shaft. Drives for pumps with a coupling seal are to be provided with a single joint; double-joint cardan shafts are not permitted in this case.

The maximum offset between the pump coupling (1b) and the spinning-pump drive (i.e. the shaft of the gear motor) on drives for pumps with a coupling seal must be max. 1 mm (referred to a drive shaft length of 1500 mm).

- The shaft of the pump drive (2) must not contact the pump drive shaft or clutch (1). Observe gap dimension (x, y).
- Do not start the pump in dry condition. If required, use a temperature-resisting silicone oil to manually rotate the pump before installing the pump into the installation / machine. Upon delivery, Barmag pumps have been lubricated already. During operation, the pump is lubricated by the pumping medium.



### 1.3.6 Removal from a line



#### **⚠ WARNING**

##### **Leakage of liquid und/or gas under pressure!**

- ▶ Before the pump is removed from the line / machine or the shaft sealing is disassembled, ensure that all product inlet and outlet bores of the pump are depressurized.
- ▶ When loosening the fastening screws, hot gases or melt may spurt out.
- ▶ Wear protective clothing, especially a face shield!

- Protect the pump against fast and irregular cooling. Do not put down on metal plates, avoid draft.

### 1.3.7 Storage of Installation Parts/Spare Parts

If the pump is to be temporarily stored prior to mounting into the line / machine, keep it in the original packing.

The storage of the pump or separate parts must satisfy the following conditions:

- Ambient temperature 15 to 25°C
- Rel. air humidity: max. 60%
- If the pump is stored, the inlet must be filled with a low-viscosity silicon oil. Filling is to occur while the drive shaft is slowly rotated in the specified direction of rotation, until the medium can be seen to flow out of the outlet openings. Next, seal the inlet and outlet holes, using the appropriate protective plugs / caps.
- The pump body must in all cases be greased using a resin free preservation oil or similar product.

### 1.3.8 Disposal

#### **Pump and pump parts**

Pumps and pump parts must be disposed of in compliance with the legal regulations.

Sealing rings must be disposed of depending on the material.

The parts must be made available to the appropriate disposal company.

#### **Production materials**

The melt residues produced in pump operation must be disposed of by the operating party according to the instructions of the material manufacturer and in compliance with the legal regulations.

## 1.4 Commissioning

### 1.4.1 General

The pump/pump unit may be commissioned only by the trained personnel of the operating party or by members of the Barmag pump service.

### 1.4.2 Preheating of the Melt Spinning Pump

- ▶ The pump must be started up only when the required operating temperature has been reached and when being evenly and completely heated.
- ▶ There are two possibilities to preheat the pump:
  - preheating in an oven
  - preheating in the installation
- ▶ In case of first commissioning, residues of silicone oil remain in the pump. In order to avoid the silicone oil crystallizing out at high temperature, the following temperatures and their respective preheating times must not be exceeded:
  - Temperature 250 °C: max. preheating time 24h
  - Temperature 300 °C: max. preheating time 8h

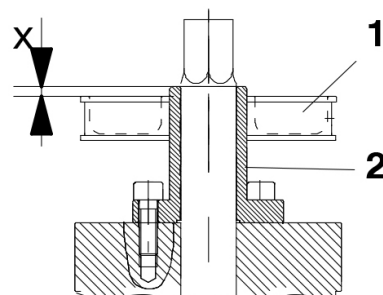
### 1.4.3 Inspection

After the proper assembly of the pump in the equipment the following tests must be carried out before starting-up (driving shaft of the spinning pump drive not yet mounted):

- Check the tightening torques of the pump fastening screws (refer to [Section 1.2.2: "Pump Drawing"](#)).
- Check the ease of pump rotation.
- Check the direction of rotation of the drive (see [Section 1.2.2: "Pump Drawing"](#) or [Section 1.2.1: "Pump data sheet"](#) for permissible direction of rotation). The wrong rotation direction can damage the pump and the installation.

### 1.4.4 Commissioning / Polymer Seal

- In order to get sufficient sealing and in order to collect the polymer emerging, a cooling pot (1) is to be installed in many cases.
- The cooling pot must be plugged onto the sealing bushing (2) prior to commissioning. Basic adjustment: **distance x = 0 to 5 mm**



After commissioning of the pump, observe the polymer outlet over a period of several days.



Displacing the cooling pot affects the outlet of polymer.

Displacement in direction of the pump: (distance x greater than 5 mm) = smaller amount of emerging polymer

The use of a cooling pot depends on the pump type and the conditions of use (insulation, rotational pump speed, operating temperature, etc.). Barmag always delivers a cooling pot together with the pump is required.

### 1.4.5 Commissioning Stuffing Boxes

#### First Start-up of Stuffing Box Packing

During assembly the screws of the stuffing box have been tightened only slightly to be able to check the ease of pump rotation prior to start-up

- Before start-up, gradually tighten the stuffing box screws crosswise until reaching the stuffing box tightening torque (see [Section 1.2.1, "Pump data sheet"](#)).
- Start up the pump.
- After starting the pump, check and if necessary adjust the pretension of the stuffing box fairly frequently (two or three times during the first few hours of operation). After the stuffing box seal has stabilized, continuous operation can be adequately monitored at weekly intervals. Observe the safety instructions in [Section 1.1.9, "Installation / Machine Specific Safety Instructions"](#).

#### Resuming Operation of the Stuffing Box Packing after a Pump Standstill

- In case of short pump downtimes (up to approx. 5 hours) no special measures are required for a resumption of operation.
- In case of extended downtimes it is recommended to replace all packing rings with new ones in order to prevent too bad a leakage of the packing during operation.
- Prior to an installation of new packing rings it must be ensured that the installation location as well as the drive shaft and the stuffing box are free from any residues or soiling, i.e. absolutely clean.

### 1.4.6 Start-up of the Pump

#### **NOTE**

We recommend to accelerate the pump drive shaft run with max. 5 min<sup>-1</sup>/sec.

- Prior to pushing the pump drive shaft onto the pump, the pump should be rotated by the inlet pressure for approx. 20 - 30 minutes in order to ensure sufficient lubrication of the gears and bearings.  
(For spinning pumps, rectangular design: maximum inlet pressure when rotating the pump: 50 bar).
- Connect the pump drive shaft with pump and witch on pump drive.

### 1.4.7 Restarting after Pump Standstill of Pumping Polymer

#### **NOTE**

We recommend to accelerate the pump drive shaft run with max.  $5 \text{ min}^{-1}/\text{sec}$ .

In order to prevent an excessive degradation of the polymer in the grease gaps of the pump, for standstills of more than about 5 hours (period of time depends on conveyed medium used) the temperature of the pump must be lowered to a temperature below the melting temperature of the pumping medium.

If not a restart of the pump involves the risk of damage to sliding points (bearing points) due to the insufficient lubricity of the polymer.

If lowering the temperature is not possible, the pump must be operated at least every 5 hours for a period until new melt emerges.

## 1.5 Maintenance

### 1.5.1 Carrying out Maintenance



#### ⚠ CAUTION

##### **Danger of crushing!**

Maintenance activities must be carried out by Barmag's Pump Service or the operating party's trained personnel.

For maintenance, Barmag provides pump workshops.

Barmag can provide relevant training for the operating company's personnel carrying out maintenance themselves. In addition, you can order a service manual for any type of pump from Barmag.

### 1.5.2 Maintenance of the Pump in the Installation



#### ⚠ CAUTION

##### **Crushing of fingers / Risk of getting caught in rotating drive shaft!**

- ▶ Working in the area of the shaft sealing while the driving shaft is rotating (e.g. retightening of the stuffing box screws or working on the cooling pot of the polymer sealing) are allowed only in case the driving shaft is completely protected against contact (e.g. by means of a hood).
- ▶ If the driving shaft can be accessed, working is allowed only when the pump drive has been switched off.
- ▶ Secure the switched off drive against unauthorized restart.
- ▶ In any case, wear suitable, tight-fitting working clothes!



#### ⚠ CAUTION

##### **Risk of burns!**

- ▶ When working on the pump or around it, always wear protective clothing especially a face shield.

A slight discharge of polymer on the shaft sealing is possible or desired. This does not adversely affect the pump's functions.



#### ⚠ CAUTION

##### **Danger of inflammation!**

- ▶ Check the pump and the area around the pump for melt residues approx. every 4 to 8 weeks and remove them if necessary.
- ⊖ Melt must not run into insulating material (e.g. into mineral wool).

### **Maintenance of polymer packing**

- If the polymer seal is operated with cooling pot, this must regularly be cleaned from polymer residues (approx. every 4 weeks). e.g. by sucking them off). This prevents the cooling pot from overflowing.

### **Maintenance of stuffing box packing**

- The tightening torques of the stuffing box screws must be checked weekly and adjusted if required. (For stuffing box tightening torques, see [Section 1.2.1, "Pump data sheet"](#))
- If the stuffing-box sealing leaks excessively and cannot be further tightened, the packing rings must be replaced as specified in the spare-parts catalog (can be ordered from Barmag). The driving shaft of the pump must be checked for damage in the sealed part and replaced, if necessary.

### **1.5.3 Spare parts**

The following information is required when ordering spare parts:

- Barmag pump No. (engraved on the pump)
- Exact identification of the parts as listed in the spare parts catalog (can be ordered from Barmag)
- Quantity

## **1.6 Faults**

Any faults can be remedied by the Barmag Pump Service or the operating party's own trained personnel.

In addition, the pump / pump unit can be sent to Barmag's Pump Service with a damage identification note serving as repair order.

1 Translation of the Original Operating Instruction

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