



# PLASVAC EH40

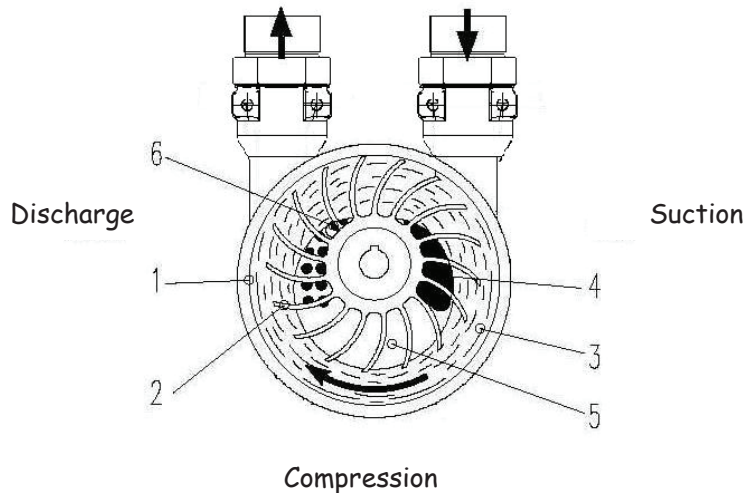
## LIQUID RING VACUUM PUMP

### OPERATING & MAINTENANCE MANUAL



## 1. DESCRIPTION

### 1.1. Operating Principle



The Plasvac EH40 is a single stage liquid ring vacuum pump made up of a circular housing (1) which contains an eccentrically mounted impeller (2). When initially filled with liquid to the shaft centreline, the rotating impeller throws this liquid outwardly, by centrifugal force, to form a rotating ring of liquid (3) spinning concentrically with the housing.

The impeller vanes are covered by this ring, to varying degrees, thus creating a series of sealed pumping chambers, with varying volumes, as the impeller rotates.

Gas is induced via an intake port (4), compressed after it passes through bottom dead centre (5), and then ejected via a discharge port (6).

Some of the sealing liquid is ejected, along with the discharged gases, requiring a continuous supply of fresh liquid to maintain integrity of the sealing ring.

The ejected seal liquid carries heat generated by the compression process, allowing a liquid ring pump to run cooler than other types.

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## 1.2. Construction

The Plasvac EH40 is a single stage pump fitted with an automatic valve on the discharge port. This valve allows a single stage pump to achieve vacuum levels and performance equal to that of a conventional two stage pump. The pump is assembled directly to a foot & flange mounted motor, giving it a very compact footprint.

## 1.3. Method of Sealing

The Plasvac EH40 has one 38 mm mechanical seal located between the impeller and motor. The seal is cooled and lubricated internally by the pumps seal liquid.

Working surfaces of standard seal are: carbon rotary, ceramic stationary & nitrile elastomers.

## 2. Operating Parameters

### 2.1. Operating Conditions

This pump has been designed to operate with a suction pressure lower than atmospheric pressure while discharging to atmosphere. Discharging to a pressure higher than atmospheric will reduce performance under vacuum and increase power consumption.

### 2.2. Operating Limits

Operating Limits:	Value
Maximum rotational speed:	2850 RPM
Minimum suction pressure <sup>1</sup> :	33 mbar
Maximum suction temperature:	100 °C
Maximum seal liquid temperature:	70 °C

### 2.3. Intake of Fluid

The suction flow into this pump may consist of non-condensable gases or gases saturated with condensable vapours. Intake of a limited volume of suspended liquid is permissible but should be restricted to 0.5 m<sup>3</sup>/h for continuous service or 1 m<sup>3</sup>/h for intermittent service.

### 2.4. Seal Liquid

A liquid ring pump must be continuously fed with sealing liquid. The liquid must not contain abrasive materials, e.g. sand or grit; otherwise the pump's service life may be compromised. Sealing liquid properties should be in the following ranges:  
Density: 800 to 1200 kg/m<sup>3</sup>  
Viscosity: < 8 cSt  
Feed pressure for seal liquid should be 1 bar higher than the maximum suction pressure of the pump. This does not apply if the pump is fed from an adjacent break tank where the water surface is level with the pump centreline.

<sup>1</sup> Dependent on temperature of seal liquid.

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## 2.4.1. Operation as a Vacuum Pump

Pump	Seal Liquid Flow (m <sup>3</sup> /h)									
	Hz	Suction Pressure (mbar)								
		33 - 200			200 - 600			>600		
		LP	RP		LP	RP		LP	RP	
5 °C	10 °C		5 °C	10 °C		5 °C	10 °C			
EH40	50	0.48	0.18	0.11	0.42	0.16	0.10	0.36	0.14	0.09

LP = Volume of fresh seal water required “once through” pump.

RP = Volume of fresh seal water required when piped for partial recirculation (when fresh seal water is 5 °C or 10 °C cooler than recirculated water).

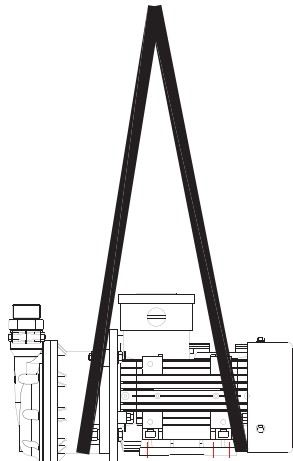
## 3. Storage

### 3.1. Lifting Pump

When lifting pump, attach slings as shown below.  
Gross weight of dry pump is 20 kg.

### 3.2. Storage

Ensure pump is stored in a cool dry environment with connection points sealed with appropriate plugs or tape.  
The plastic construction of the Plasvac pump makes it virtually corrosion free thereby eliminating “freezing” of the impeller during storage.



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## 4. Installation

### 4.1. Mounting

The Plasvac EH40 should be mounted horizontally on a flat level base. The pump body should, preferably, overhang the baseplate, as shown below, however if this is not possible, insert a 20 mm thick packer under the motor feet.

### 4.2. Connections

Inlet/outlet connections have G1-1/4" (1-1/4" BSP parallel) threads. Connection adaptors are "plug-in" type, free to rotate about their vertical centrelines, to minimise pipe stress transferring to the pump head. Adaptors are easily replaced if damaged, held in place by stainless steel bolts and sealed with O-rings. Use of an inline strainer is recommended for the first 100 hours of operation to prevent intake of material likely to damage the pump.

### 4.3. Seal Liquid Supply

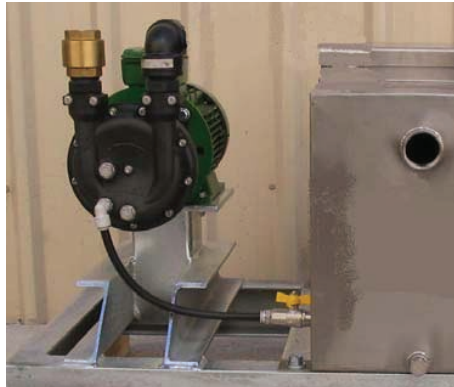
Seal liquid connection is a G3/8" (3/8 inch BSP parallel thread) located on the front of the pump at the 7 o'clock position.

Seal liquid may be supplied to the pump in several ways:

#### 4.3.1. From Break Tank

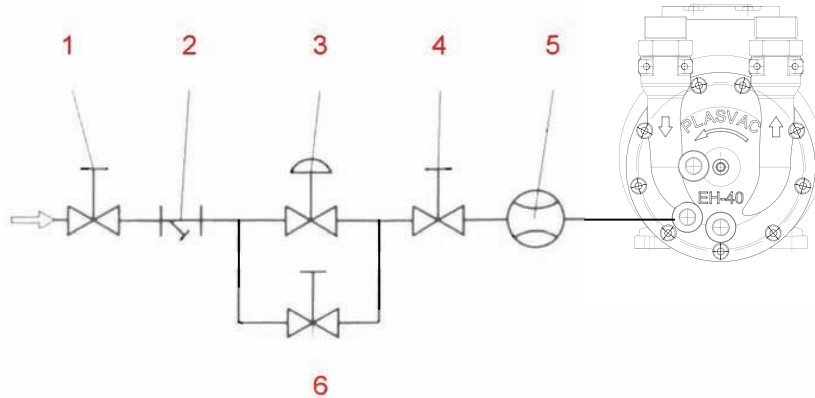
A small break tank, fitted with a float valve, can be installed adjacent to the pump.

The liquid surface level should be adjusted to coincide with the centre of the motor shaft. This ensures the pump is never more than half filled with liquid when started.



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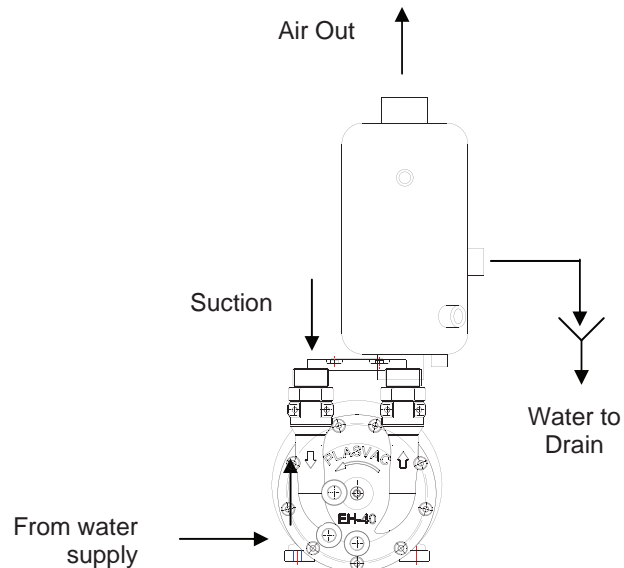
## 4.3.2. From Mains Supply



- 1 ----- Isolating Valve
- 2 ----- Y-Strainer
- 3 ----- Solenoid Valve
- 4 ----- Adjusting Valve
- 5 ----- Flow meter (optional)
- 6 ----- Solenoid by-pass

## 4.3.3. “Once Through” System

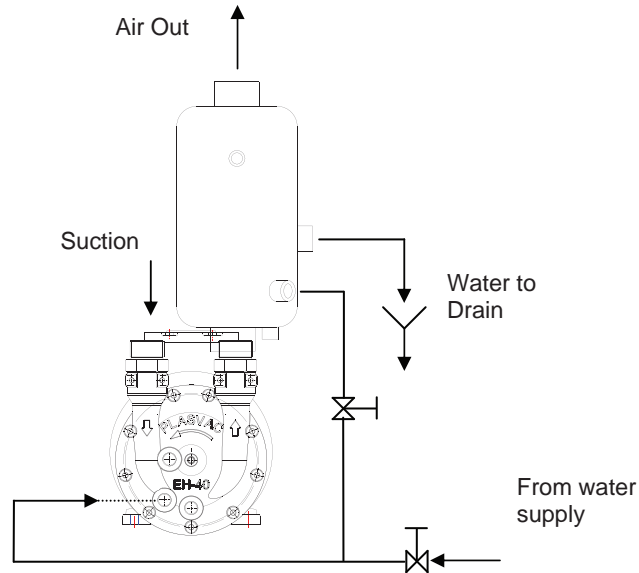
This piping arrangement is the simplest and is recommended provided ample water is available and the discharged water has not been contaminated.



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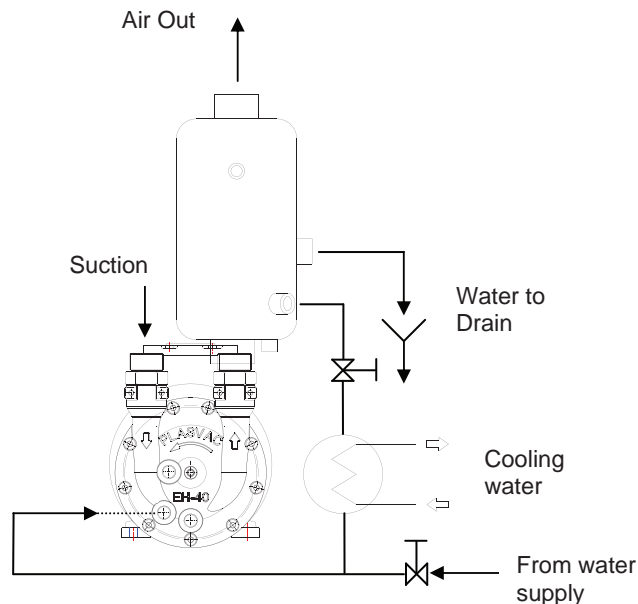
### 4.3.4. Partial Recirculation

This piping arrangement is recommended as a water saving feature when limited seal water is available and the discharged water is non-polluting.



### 4.3.5. Total Recirculation

This piping arrangement is recommended if the seal water is likely to become contaminated by the intake gas, thereby preventing disposal via normal means. Note: Pressure drop across heat exchanger must be less than 10kPa otherwise a recirculation pump must be installed.



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## 4.4. Non Return Valve

A non-return valve should always be installed on the suction connection to prevent back-flow of air and seal liquid should the power supply be interrupted while the pump is under vacuum.

Note: This valve should be of a type having low pressure drop characteristics.

## 4.5. Electrical Connections

Electrical connections must be in accordance with local wiring regulations.

Check the motor nameplate for:

Voltage;  
Number of phases;  
Frequency;  
Maximum current draw.

The motor must be suitably earthed and protected by a thermal overload set to the rated current shown on motor nameplate.

A connecting diagram can be found inside the motor terminal box.

## 5. Operation

Prior to initial start-up of the pump, the following procedures should be carried out:

### 5.1. Add Seal Liquid to Pump

Half fill the pump with seal liquid (approximately 0.25 litres) until level with the motor shaft centre. This can be done via the suction port before the piping is attached. If the front casing plug (at the 9 o'clock position) is removed, liquid will flow out when sufficient has been added.

If seal water is being supplied by a correctly installed break tank, the pump will automatically fill to the correct level.

### 5.2. Check Rotation of Pump

Ensure the direction of rotation of the pump is correct by observing the motor fan (pump should rotate clockwise when viewed from the motor fan).

If the direction of rotation is incorrect, isolate the electrical power prior to correcting.



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### **5.3. First Start-up**

Ensure the isolating valve on the suction piping is in the open position.  
Ensure seal water is available.

**DO NOT RUN PUMP DRY**

#### **5.3.1. Manual Seal Water Valve**

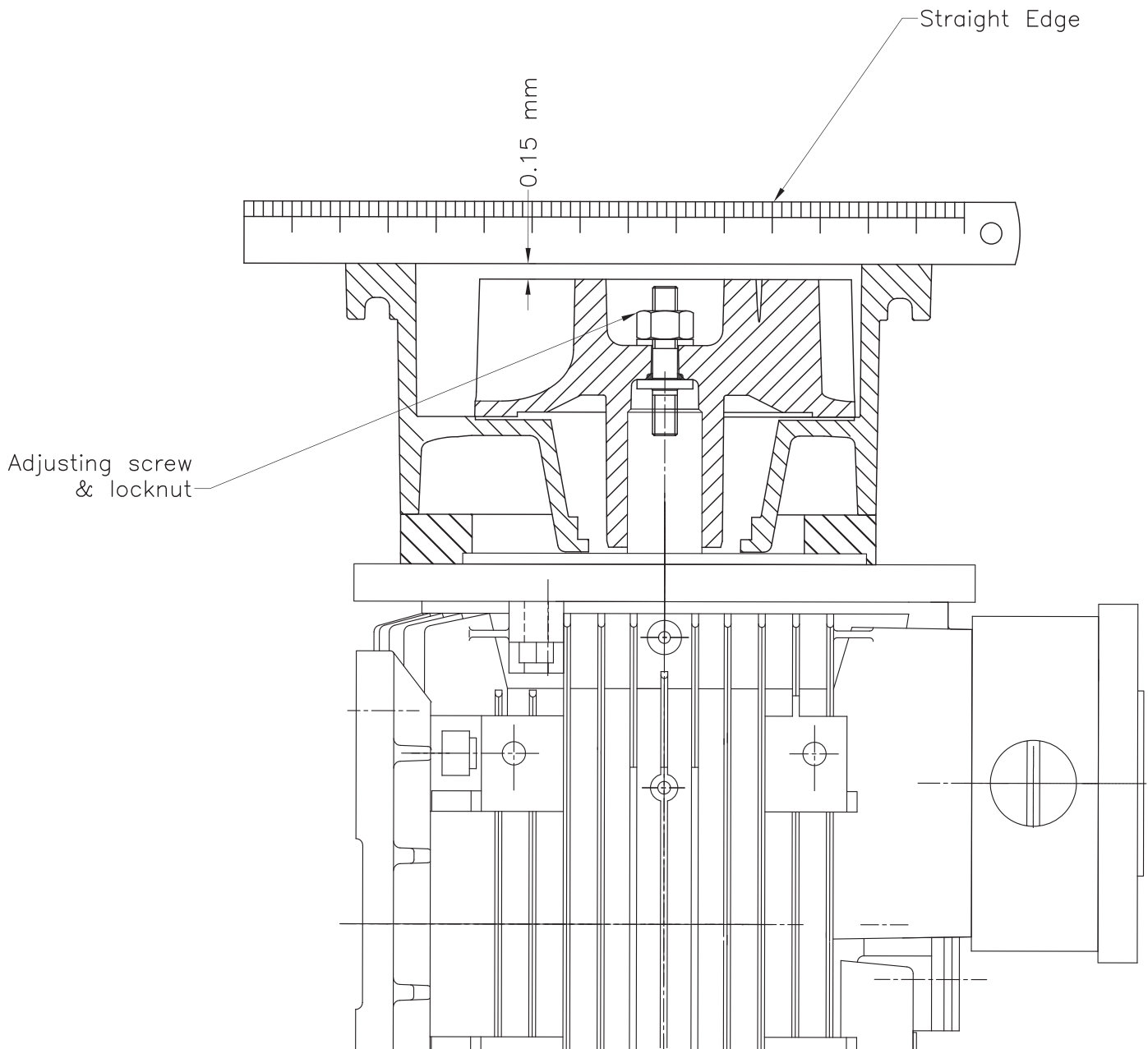
Immediately after starting pump, open the seal water isolating valve and adjust the flow as per the chart at heading 2.4.1.  
If a flow meter has not been installed, the flow can be calculated by collecting the discharge water over a set period of time.

#### **5.3.2. Solenoid Seal Water Valve**

The seal water isolating solenoid valve should be wired in parallel with the motor control electrics so the motor and valve should activate together.

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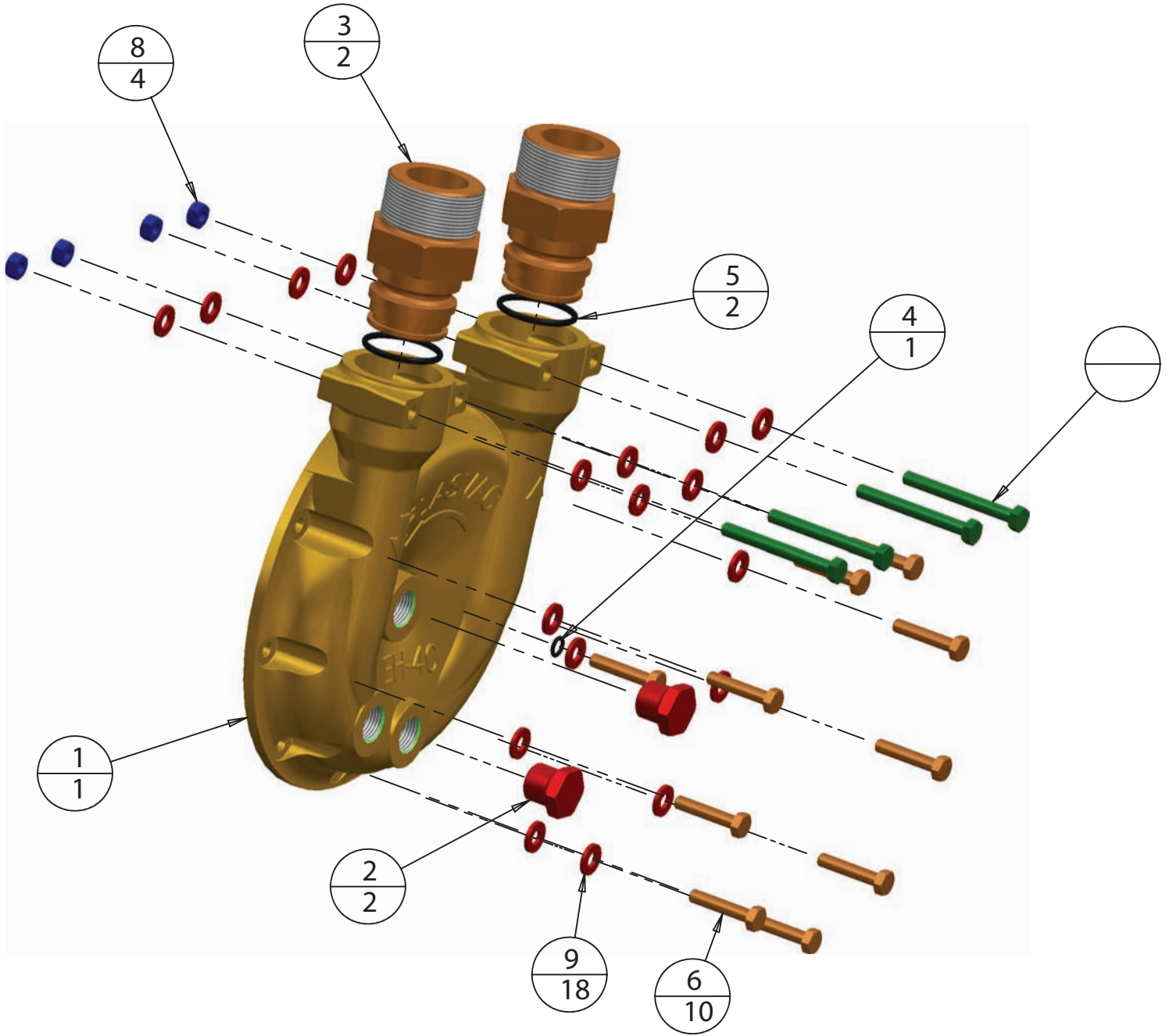
## Setting Impeller front clearance



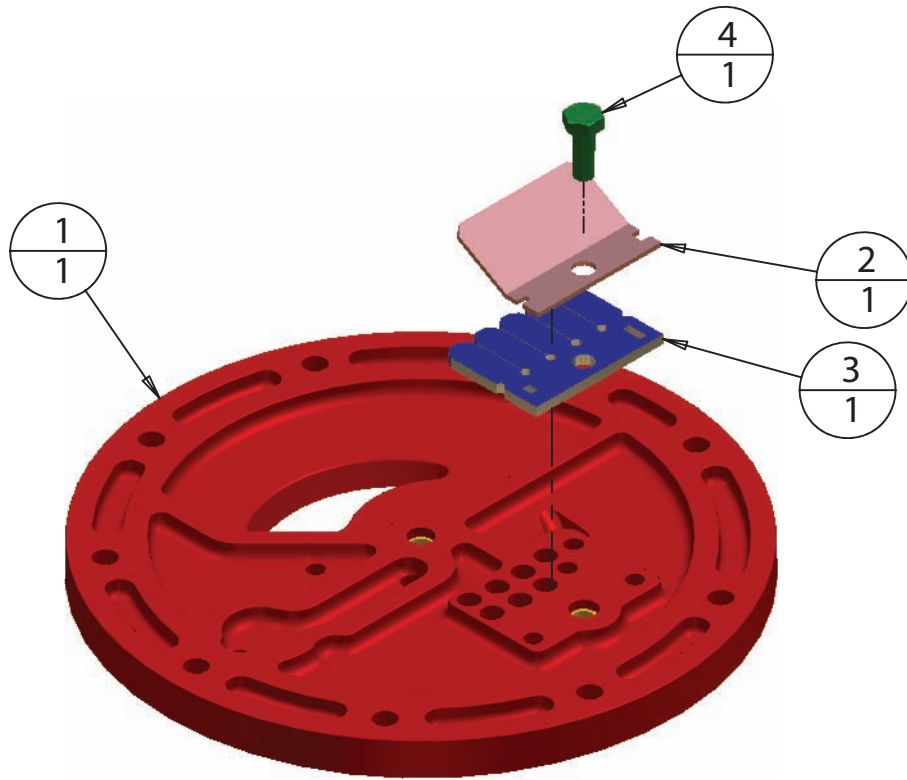
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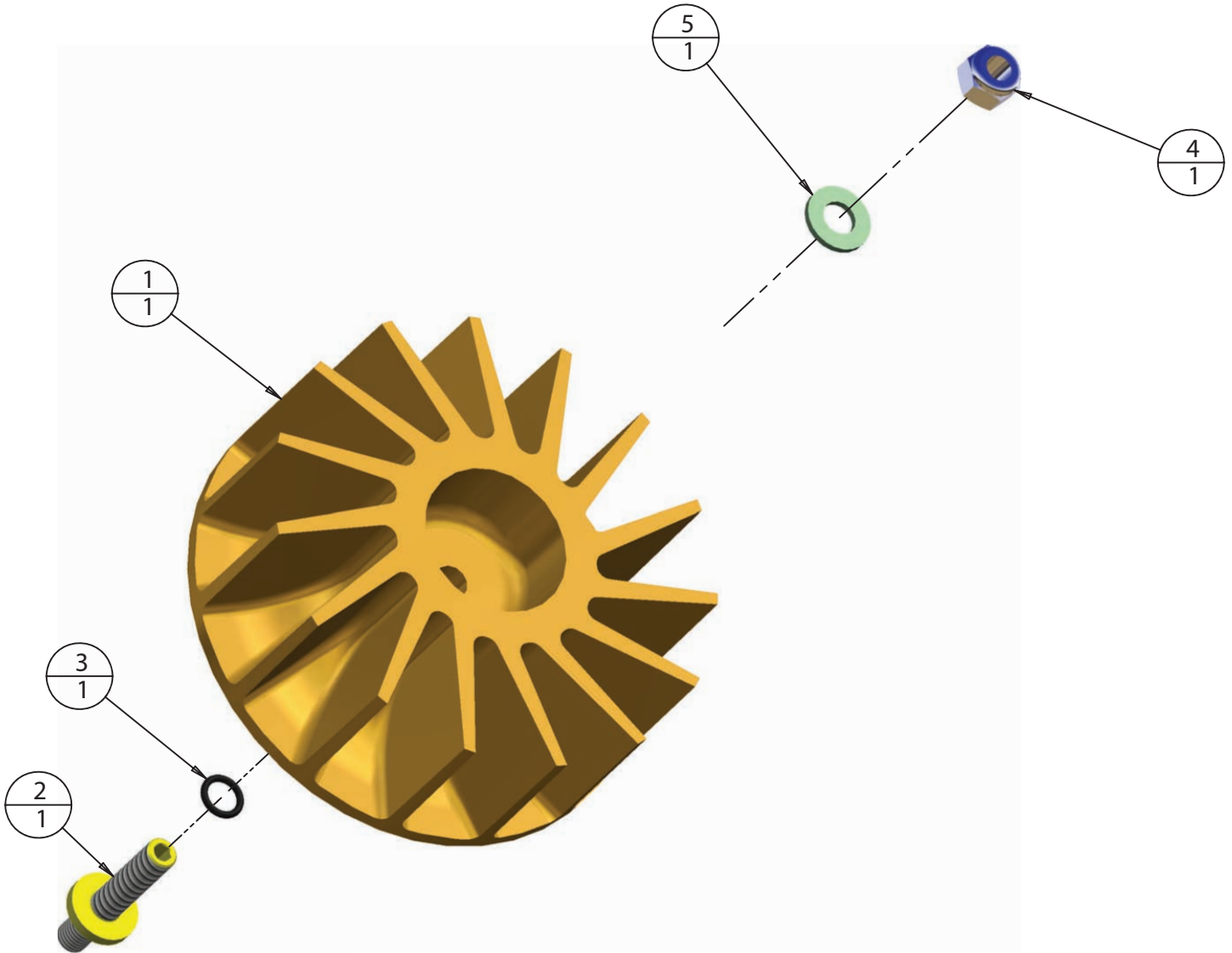
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Position Number	Part Number	Description	Material	Quantity per pump
1	EH40001	Head	Plastic	1
2	EH40002	Port Plate	Plastic	1
3	EH40003	Impeller	Plastic	1
4	EH40004	Casing	Plastic	1
5	EH40005	Adaptor Plate	Plastic	1
6	EH40006	Pipe Coupling	Plastic	2
7	EH40007	O-Ring BS123	Viton	2
8	EH40008	Mechanical Seal	C/TC/Viton	1
9	EH40009	Teflon Valve	Teflon	1
10	EH40010	Valve Plate	316SS	1
11	EH40011	Bolt M6x30 Skt Hd	316SS	10
12	EH40012	Washer M6 Flt	316SS	16
13	EH40013	Plug 3/8"BSP	316SS	2
14	EH40014	Bolt M6x50 Hex Hd	316SS	4
15	EH40015	Nut M6 Nyloc	316SS	4
16	EH40016	Bolt M6x12 Skt Hd	316SS	1
17	EH40017	Bolt M6x16 Skt Hd	316SS	6
18	EH40018	Adjusting Bolt	316SS	1
19	EH40019	O-Ring BS804	Viton	1
20	EH40020	Nut M8 Nyloc	316SS	1
21	EH40021	Washer M8 Flt	316SS	1
22	EH40022	Washer M6 Spr	316SS	1
23	EH40023	Motor 1.5 kW	Aluminium	1