

# MOTORS

**Repair Instruction**

*Orbital X*



*together in motion*

White is a leading global provider of motor and steering solutions that power the evolution of mobile and industrial applications around the world.



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# Safety precautions

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Always consider safety precautions before beginning a service procedure. Protect yourself and others from injury. Take the following general precautions whenever servicing a hydraulic system.

## Unintended machine movement



### Warning

*Unintended movement of the machine or mechanism may cause injury to the technician or bystanders. To prevent unintended movement, secure the machine or disable / dis-connect the mechanism while servicing.*

## Flammable cleaning solvents



### Warning

*Some cleaning solvents are flammable. To eliminate the risk of fire, do not use cleaning solvents in an area where a source of ignition may be present.*

## Fluid under pressure



### Warning

*Escaping hydraulic fluid under pressure can have enough force to penetrate your skin causing serious injury and/or infection. This fluid may also be hot enough to cause burns. Use caution when dealing with hydraulic fluid under pressure. Relieve pressure in the system before removing hoses, fittings, gauges, or components. Never use your hand or any other body part to check for leaks in a pressurized line. Seek medical attention immediately if you are cut by hydraulic fluid.*

## Personal safety



### Warning

*Protect yourself from injury. Use proper safety equipment, including safety glasses, at all times.*

# Chapter 1

## General Overview

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### Topics:

- *General overview*
- *Exploded parts list*

## General overview

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Follow these general procedures when working on Orbital X Motors.

Seal kit consists of oil seal, washers and O-rings. Ordering code for a seal kit is 11188319.

### Keep it clean

As with any precision equipment, keep all parts free of foreign material and chemicals.

Protect all exposed sealing surfaces and open cavities from damage and foreign material.

If left unattended, cover the motor with a protective layer of plastic.

### Lubricate O-rings

Lubricate O-rings. Additionally, lubricate all moving parts with oil, such as spool shaft, cardan shaft and gear set.

### Tools

Proper assembly/disassembly of Orbital X motors require the following tools. You may use the dimensions and information in the drawings to fabricate them.

<b>Pallet for A2 flange</b>	ED074545
<b>Pallet for C-flange</b>	ED075400
<b>Pallet for OMPW</b>	ED075401
<b>Torpedo</b>	ED074514
<b>Check valve sleeves</b>	ED075904
<b>Fork</b>	ED075354
<b>Mandrel for shaft seal</b>	DWG00018343
<b>Support ring for shaft seal assembly</b>	DWG00018421

Table 1 Tool list

## Exploded parts list

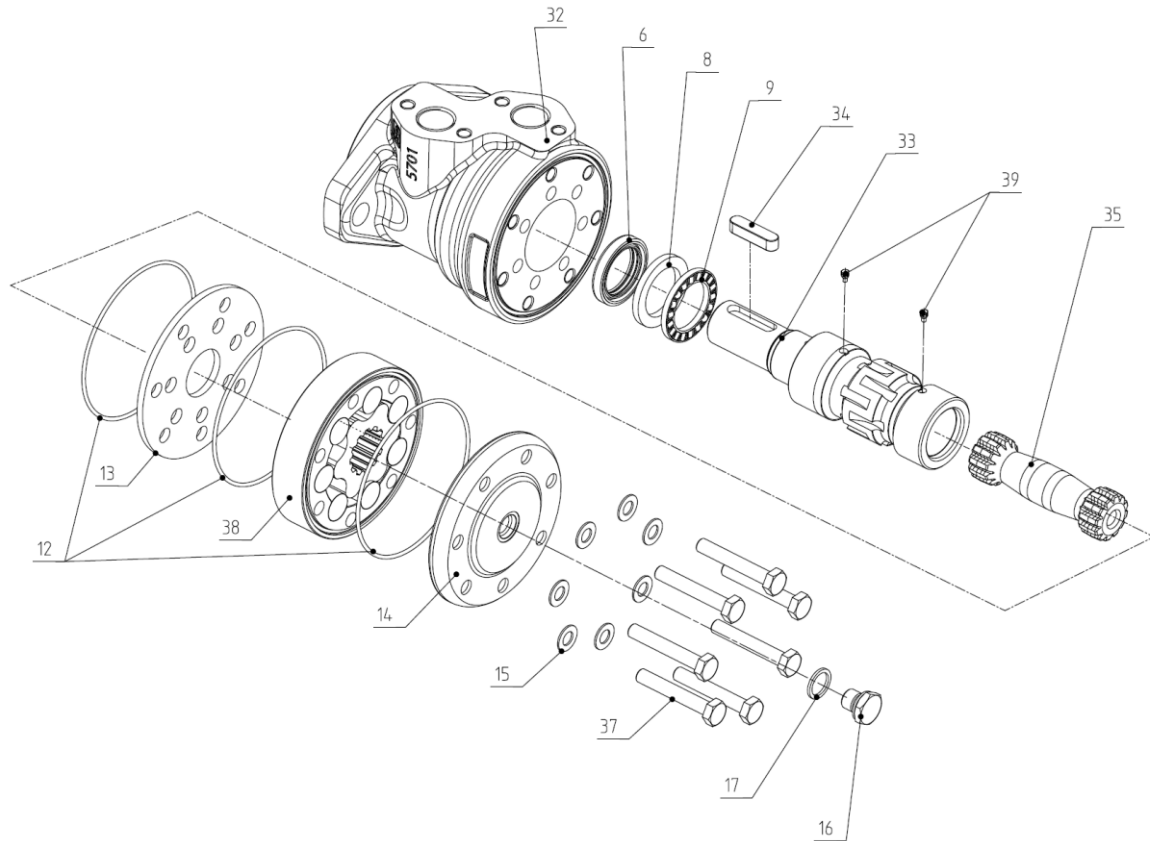


Figure 1 Orbital X Exploded View

Item	Description	Number per unit
6	Shaft seal	1 (part of the seal kit)
8	Washer	1
9	Axial bearing	1
12	O-ring	3 (part of the seal kit)
13	Distributor plate	1
14	End cover	1
15	Washer	vary depending on configuration (part of the seal kit)
16	Drain plug	1
32	Housing	1
33	Spool shaft	1
34	Key	1
35	Cardan shaft	1
37	Bolt	vary depending on configuration
38	Gear set	1
39	Check valve	2

## Chapter 2

# Disassembly / Assembly

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### Topics:

- *Disassembly procedure*
- *Assembly procedure*
- *OMP X and OMR X offset ports*
- *OMP X and OMR X aligned ports*
- *Distributor plate*
- *Cardan shaft*
- *Marking transfer indicated*
- *Gear set*
- *Installation of gearwheel to cardan shaft*
- *Install end cover*
- *Clamping*
- *Additional tools needed*



## Disassembly procedure

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1. Use A2 flange, C-flange, or wheel version pallet depending on your housing configuration.
2. Position motor housing vertically so that the port surface is toward the operator.
3. Untighten the bolts (37), that holds the end cover (14).
4. Remove the bolts and throw away the washers (15), new washers are part of the seal kit.
5. Remove end cover and throw away the O-rings (12), new O-rings are part of the seal kit.
6. Remove gearset (38), cardan shaft (35) and distributor plate (13).
7. Remove shaft (33) and keep the check valves for reassembly (39).
8. Remove axial bearing (9) and washer (8)
9. Rotate housing to have access to the main hole from the outside.
10. Press out the shaft seal using the mandrel with the side marked "OUT" (drawing DWG00018343)

## Assembly procedure

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1. Position pilot flange of the housing on the support ring (drawing DWG00018421) in such a way that the lip of the ring goes in the main hole of the housing.

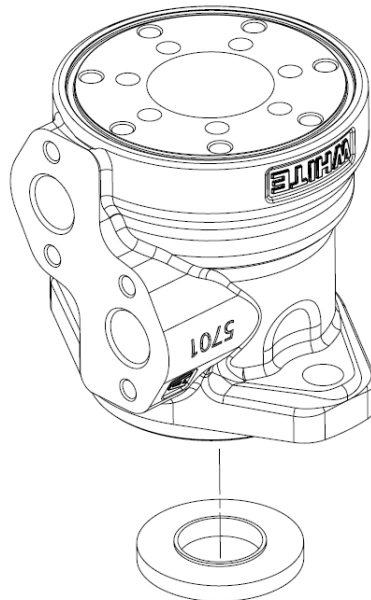


Figure 2: Step 1 of assembly procedure

2. Press the shaft seal (6) in with a force of 12kN using a press and a mandrel side marked "IN"
3. Install washer (8) into the housing.
4. Install axial bearing (9) into housing.

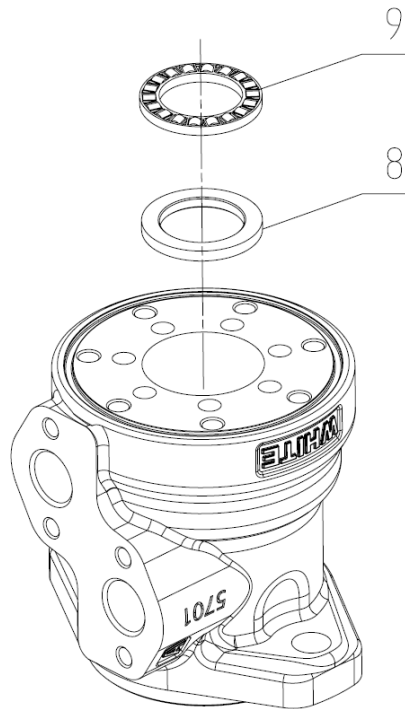


Figure 3: Step 3, 4 of assembly procedure

5. Check if the two check valves (39) are in the spool shaft. Press (with fingers) the check valves into place.

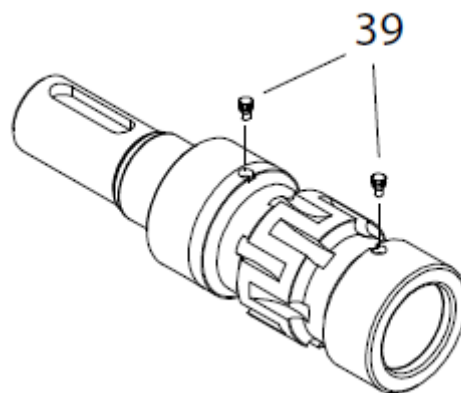


Figure 4: Step 5 of assembly procedure

6. The rear shaft end must be marked before it is fitted. The mark must be positioned vertically above a commutation slot leading up to the front annular channel.

To prevent check valve from falling out and to protect shaft seal during assembly, please use special tools: drawing ED075904 (check valve) and drawing ED074514 (torpedo).

6.1 Place check valve tool onto housing in one of the commutation holes and O-ring groove.

6.2 Place torpedo into housing and press out when shaft is installed. Shaft should be positioned in two different ways, depending on Motor type (OMP X or OMR X).

OMP X and OMR X **with offset ports** - central commutation groove turned about 5 degrees from the center of the housing (counterclockwise rotation). After inserting spool shaft into housing, turn the shaft so that it aligns with the center of the housing.

OMP X and OMR X **with aligned ports** - central commutation groove in coincidence with the center of the housing.

6.3 Grease the O-ring and put it in the groove of the housing.

6.4 Ensure the spool shaft edge is slightly below motor housing.

## OMP X and OMR X offset ports

The shaft must be positioned with the groove offset with regard to the inner circle of holes in the housing.

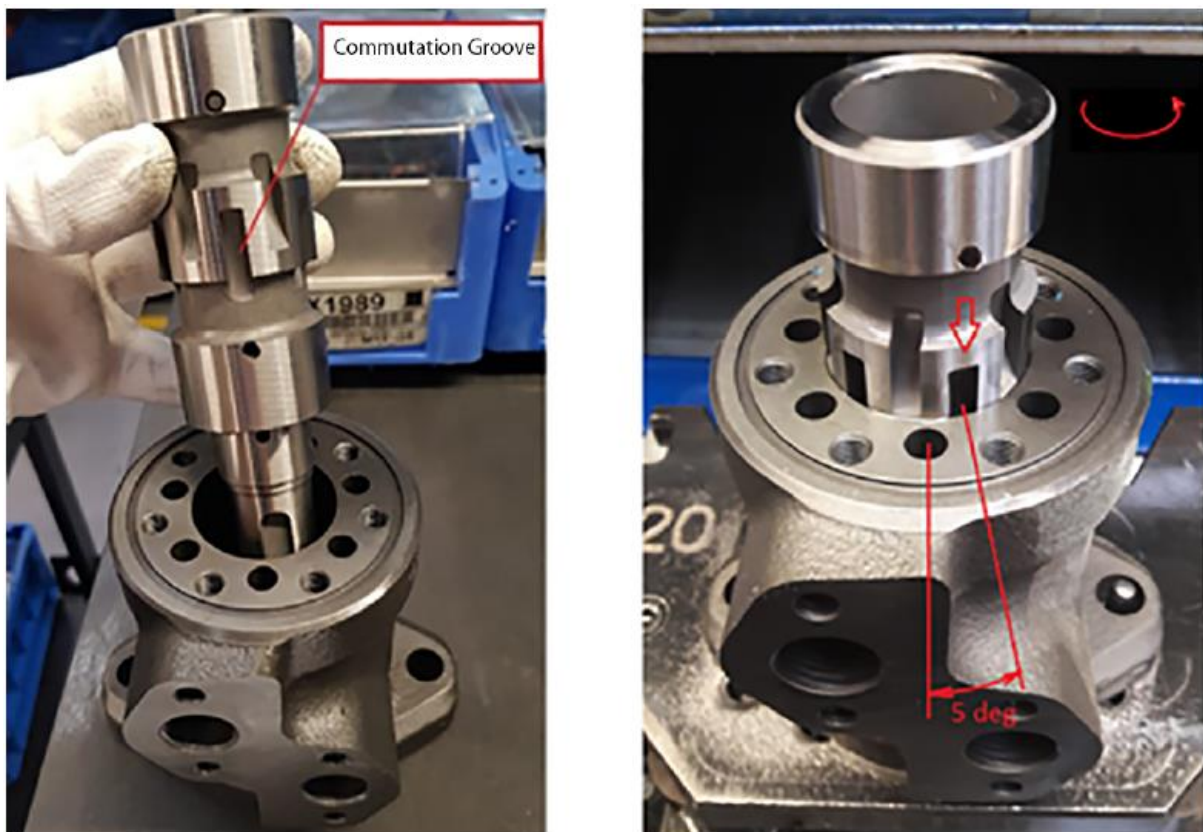


Figure 5: Correct positioning of shaft (offset ports)

## OMP X and OMR X aligned ports

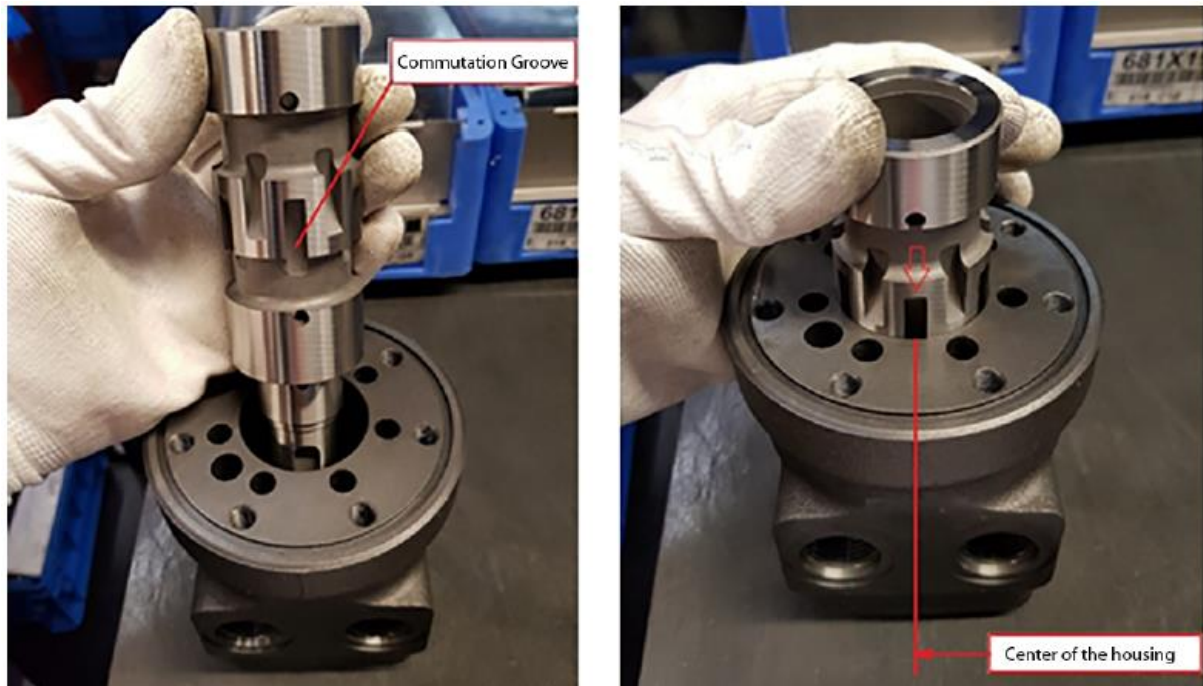


Figure 6 Correct positioning of shaft (aligned ports)

## Distributor plate

Mount the distributor plate (pos. 13) on the housing.

Make sure that the distributor plate holes align with holes in the housing. Distributor plate holes must align.

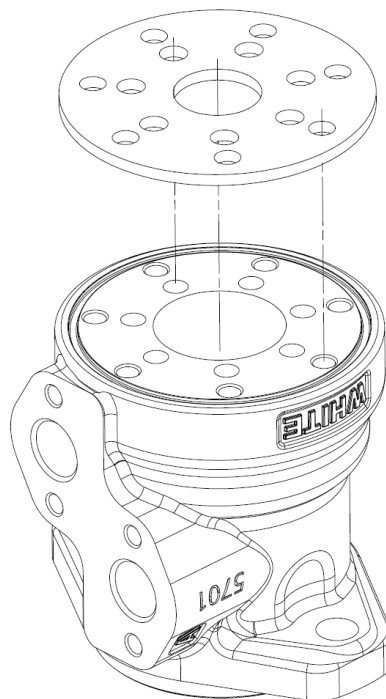


Figure 7 Distributor plate

## Cardan shaft

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Guide the cardan shaft down into the motor housing.

In case of different spline lengths, turn the cardan shaft to ensure the long spline end is fitted in the output shaft.

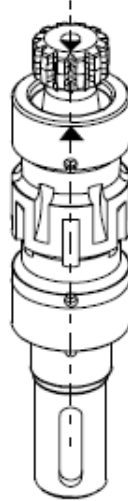


Figure 8: Cardan shaft

Transfer marking from output shaft to cardan shaft.

## Marking transfer indicated

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For smaller displacement, retain the cardan shaft using the fork tool (ED075353).

Fork is needed in the following displacements:

Motor Type	Displacement [cc]
OMP X	25
	32
	36
	40
	50
	60
	80
	100
OMR X	36
	50

## Gear set

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Place the O-rings (greased) in the O-ring grooves of the gearwheel.

In gearwheels with non-through splines, place the gearwheel with the recess in the spline hole down towards the housing.

Place the gearwheel set on the cardan shaft, so that the top of a tooth in the external teeth of the gearwheel is vertically above the mark on the cardan shaft.

Turn the gearwheel set counterclockwise until the cardan shaft and the gearwheel start to mesh (15).

Turn the gearwheel rim so that the holes align the screws properly.

## Installation of gearwheel to cardan shaft

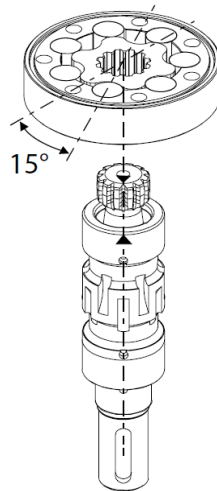


Figure 8: Installation of gearwheel to cardan shaft

## Install end cover

Turn the end cover (pos. 14) so that the holes line up.  
 Note the orientation of end cover for Offset/Aligned port.  
 Install new washers (pos. 15), and end cover bolts (pos. 37).  
 Mind bolt torque and sequence to ensure correct assembly.  
 Depending on different motor type, bolts vary from 5-7 pieces.

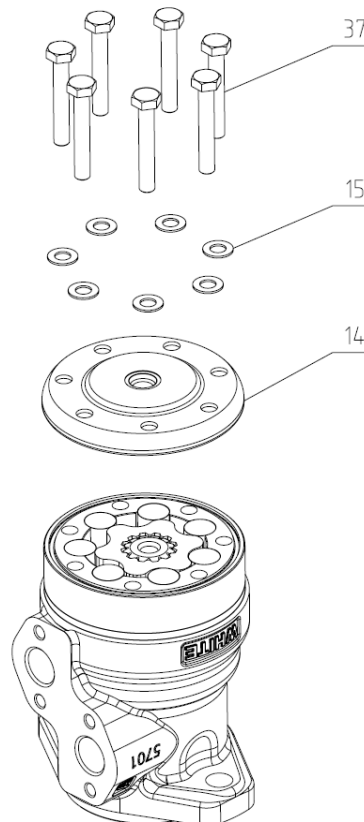


Figure 9: Endcover installation

## Clamping

### Bolt torque and sequence

Start all bolts by hand, two or three turns, to avoid damaging the threads when using a pneumatic wrench.

Bolt sequence:

#### Offset ports - 7 bolts:

Bolt	Tightening torque
1,2	8Nm [71lbf*in] – 10Nm [88,5lbf*in] pre-tightened
3-9	32,5Nm [288lbf*in] +/- 2,5Nm [22lbf*in]

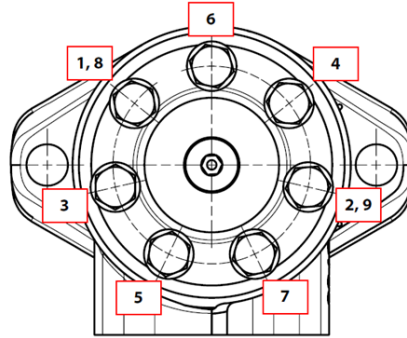


Figure 10: Offset ports: Tightening sequence

#### OMP X aligned - 6 bolts:

Bolt	Tightening torque
1,2	8Nm [71lbf*in] – 10Nm [88,5lbf*in] pre-tightened
3-8	32,5Nm [288lbf*in] +/- 2,5Nm [22lbf*in]

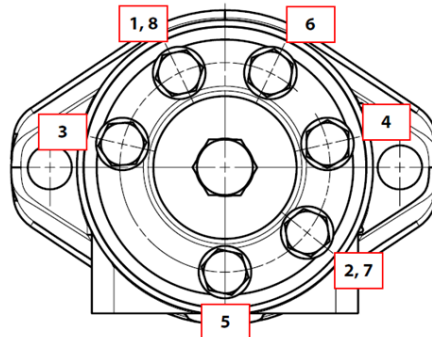


Figure 11: Aligned ports: Tightening sequence

#### End port version - 5 bolts:

Bolt	Tightening torque
1,2	8Nm [71lbf*in] – 10Nm [88,5lbf*in] pre-tightened
3-7	32,5Nm [288lbf*in] +/- 2,5Nm [22lbf*in]

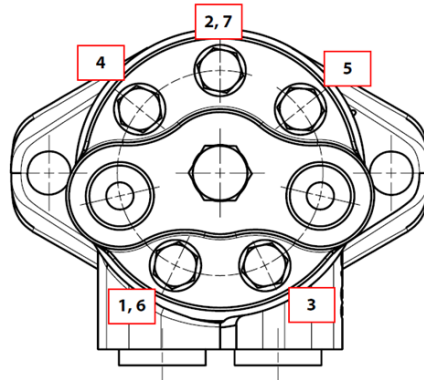


Figure 12: End ports: Tightening sequence

## Additional tools needed

These tools are recommended by White, but should be sourced directly by the customer. Please contact White for separate technical drawing files if needed.

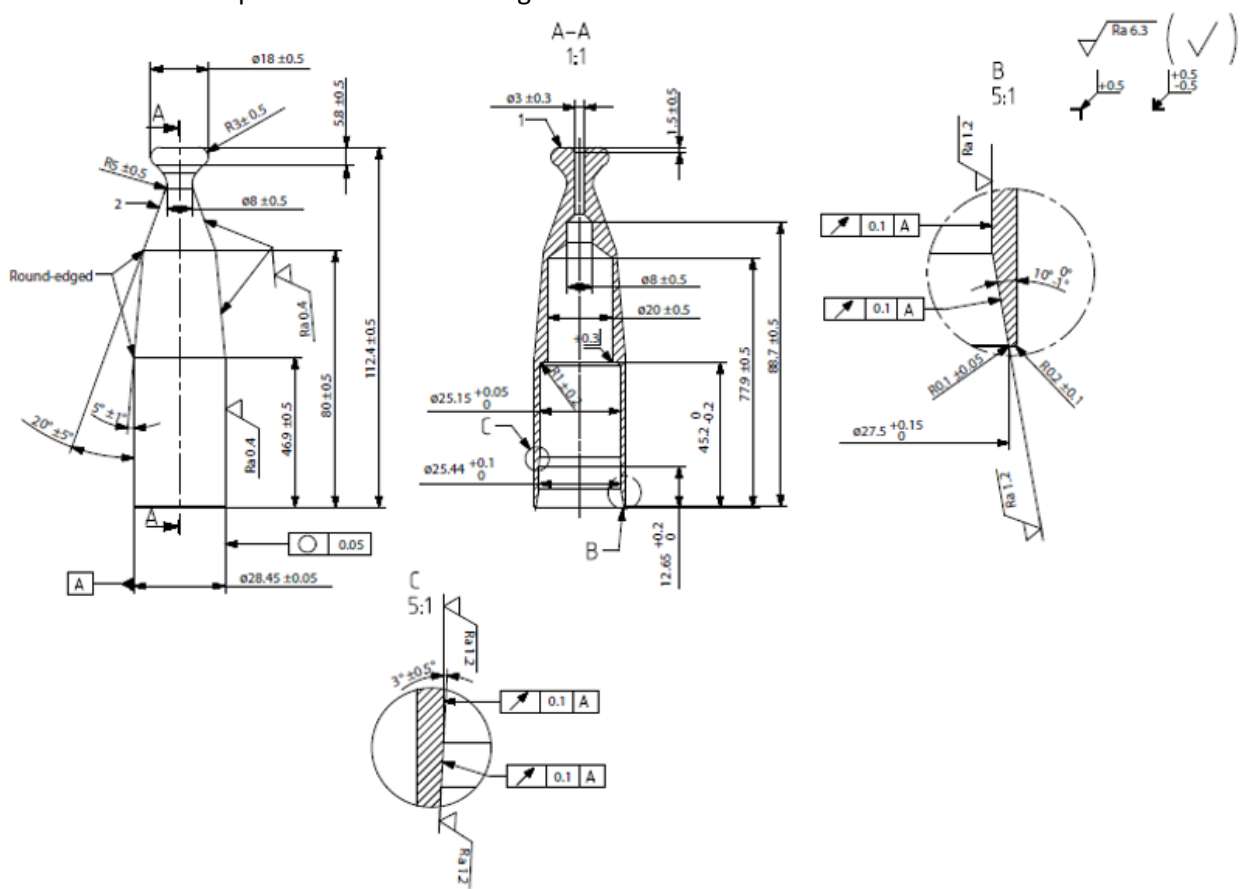


Figure 13: Torpedo for 1 in tapered shaft



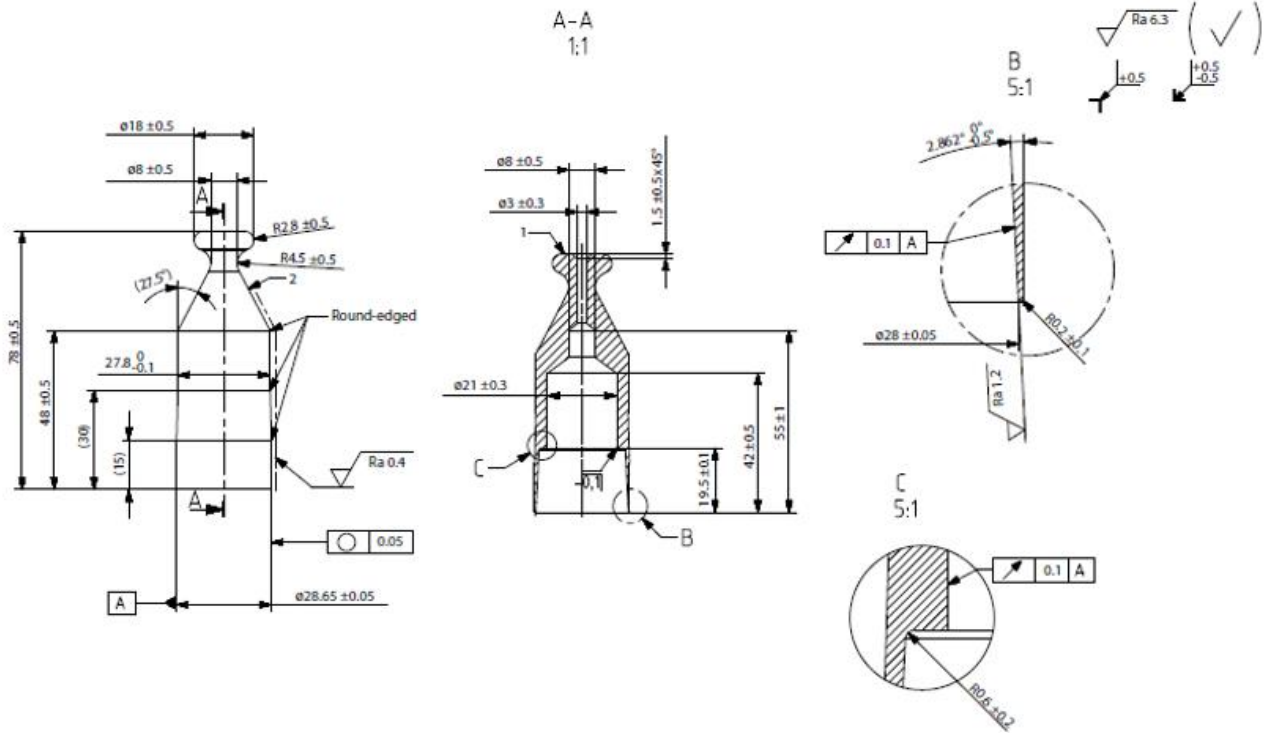


Figure 14: Torpedo for  $\varnothing 28, \varnothing 56$  tapered shaft

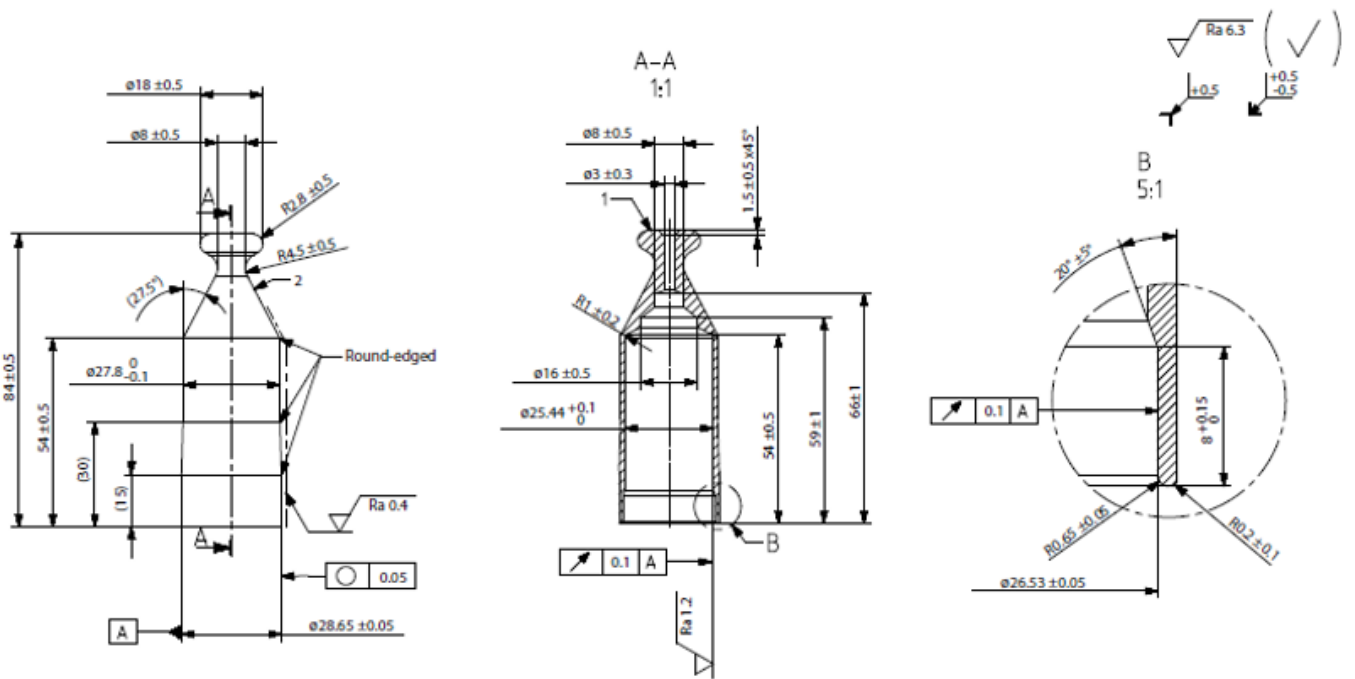


Figure 15: Torpedo for cylindrical long shaft

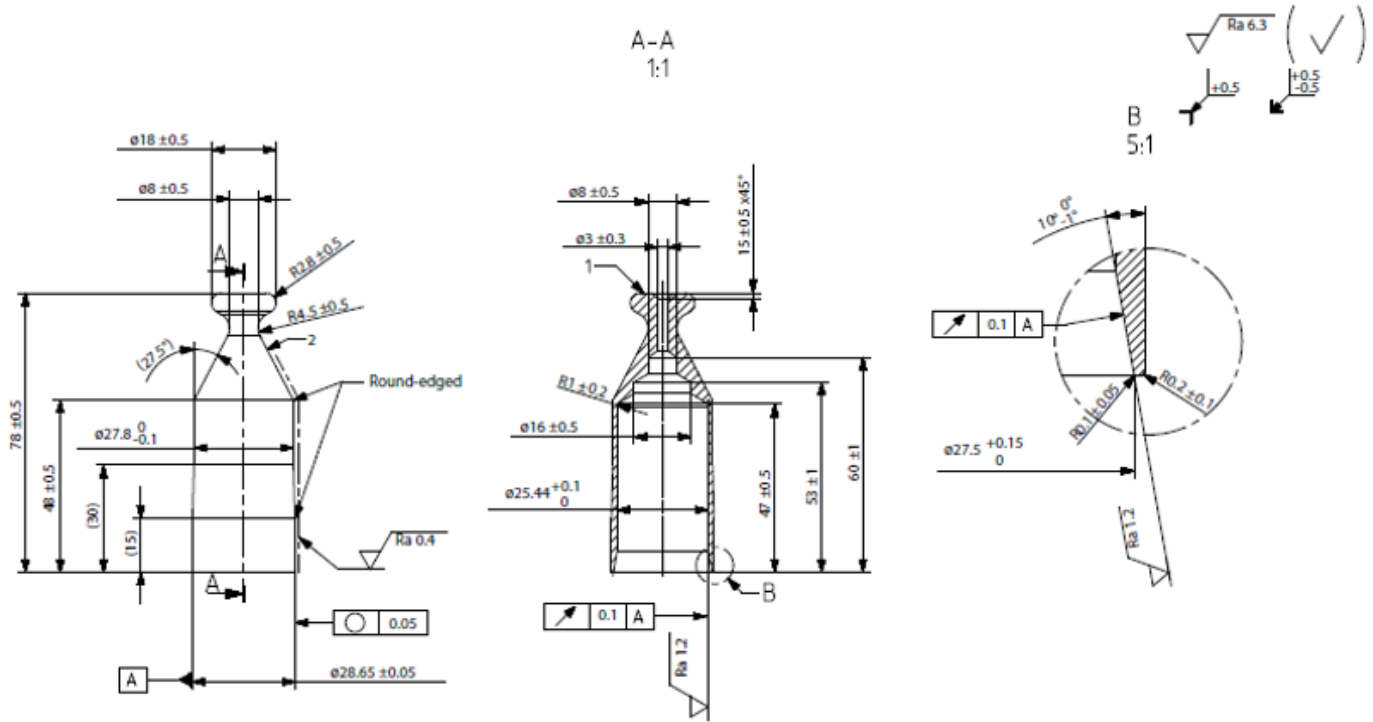


Figure 16: Torpedo for 25mm, 1 in., and 7/8 splined shaft

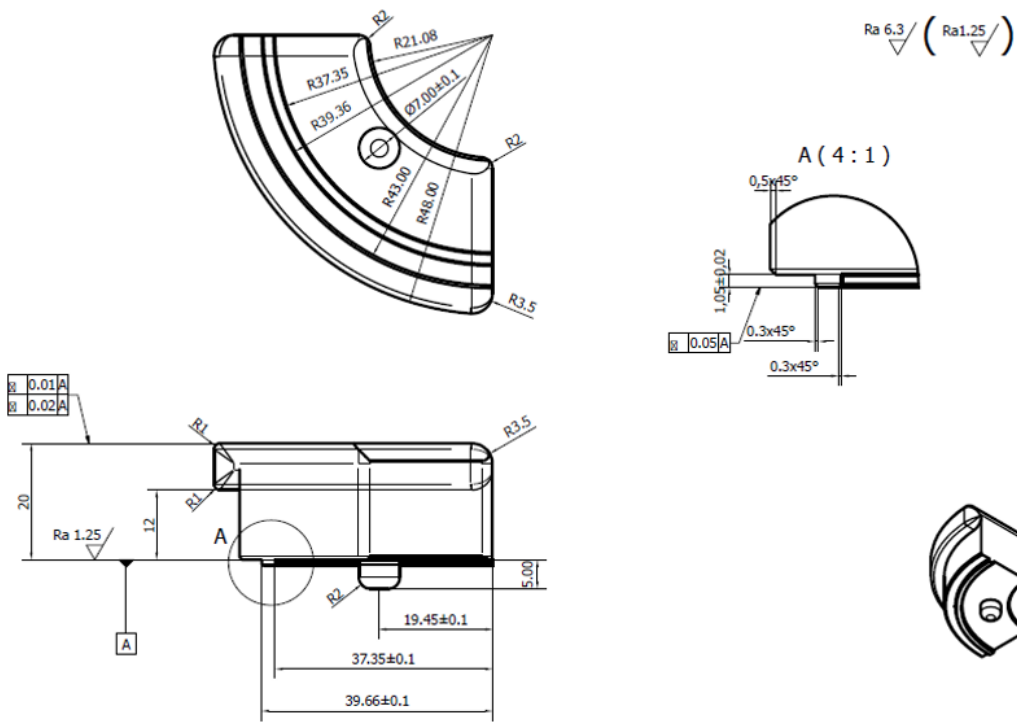


Figure 17: OMP check valve sleeve

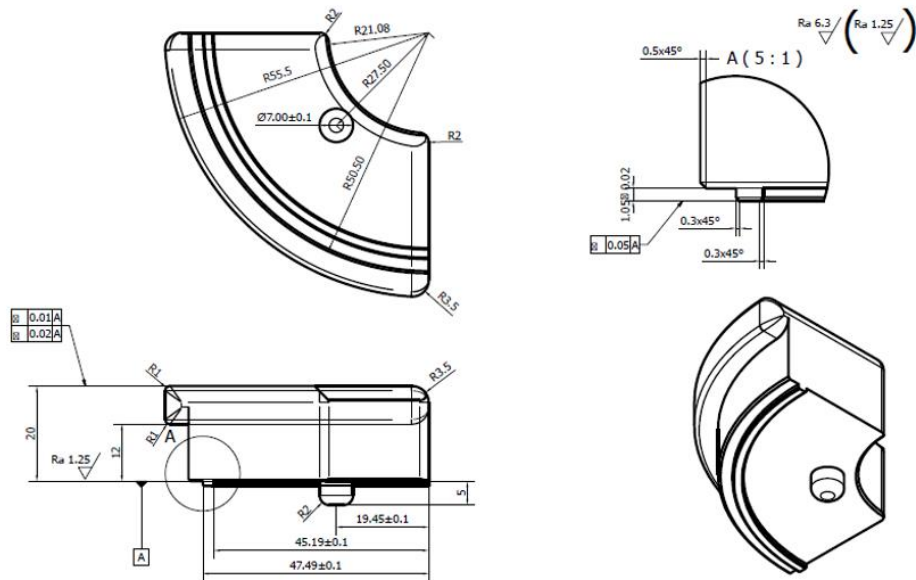


Figure 18: OMR check valve sleeve

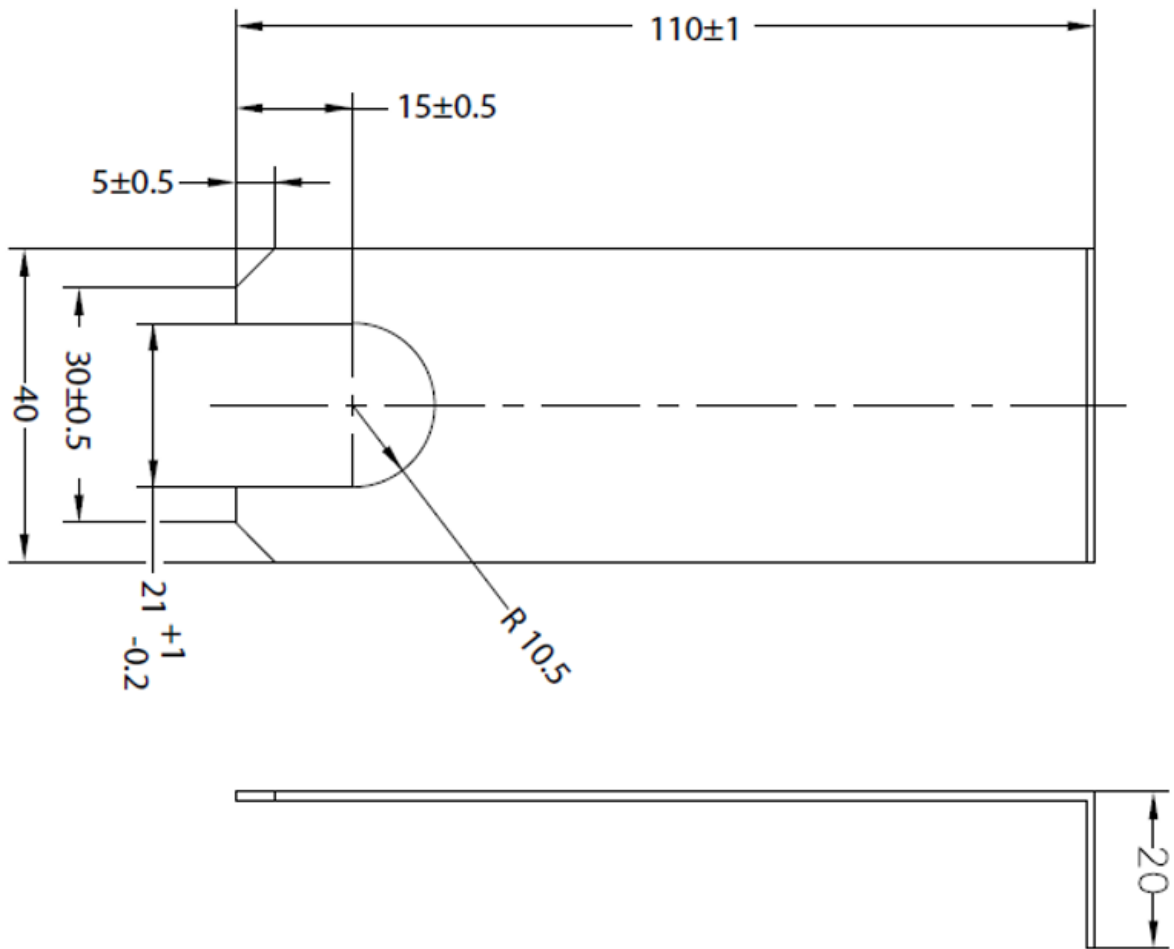


Figure 19: Fork



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