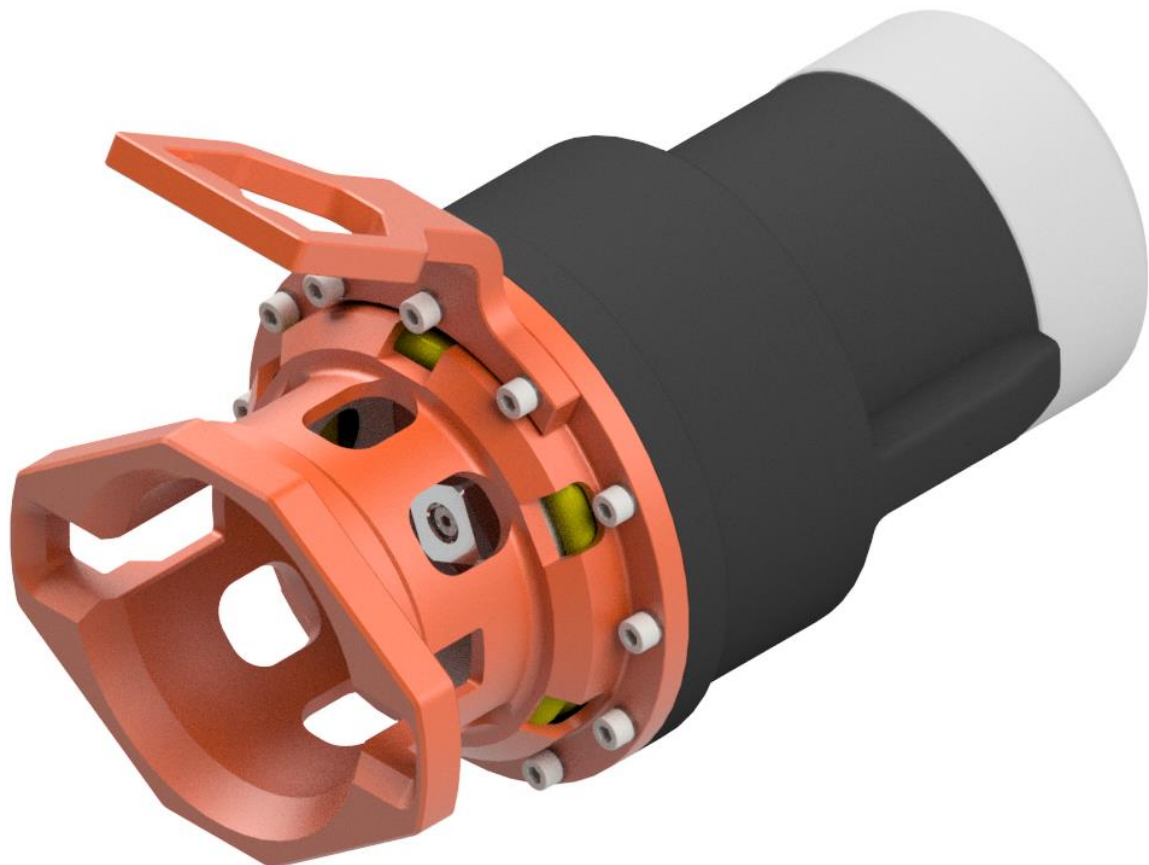




TECHNICAL DOCUMENT

DOCUMENT TITLE: Operation & Maintenance Manual for Class 5 Gearbox  
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### OBJECTIVE

The objective of this document is to present a comprehensive technical description of the Blue Logic Class 5 Gearbox. Relevant technical aspects for information and familiarization are covered as well as detailed technical data. For further information reference is made to drawing BA7652 Class 5 Gearbox.

### ABSTRACT

The Blue Logic Gear Box Cl. 5 is designed in accordance with ISO/API, and the purpose is to enable operation of equipment with Class 5 interface using a torque tool with Class 4 output interface.

### REVISION CHANGE/RECORD

REV	REASON FOR REVISION/ DESCRIPTION OF CHANGES
01	Issued for Use



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## 1. INTRODUCTION

The Class 5 Gearbox is designed to enable operation of Class 5 interfaces using a Class 4 torque tool for maximum flexibility at minimum cost.

The gearbox can be delivered as a complete kit, BB2406, including required components to adapt the tool to the interfaces as described above.

The Gearboxes are available as 6,7kNm (standard version) and 10,8kNm versions.

### 1.1. DOCUMENT USE

This document shall be used as a general information for all aspects related to safe use, installation, removal, maintenance, and storage of the Class 5 Gearbox.

### 1.2. REFERENCES

Latest version of the following documents

Id.	Doc. No	Originator	Document Title
/01/	BA7652	Blue Logic	Class 5 Gear Box
/02/	BB2406	Blue Logic	Gear Box Cl. 5 Arrangement (Kit)

### 1.3. ABBREVIATIONS

ROV	Remotely Operated Vehicle
HPU	Hydraulic Power Unit
FAT	Factory Acceptance Test
TT	Torque Tool



## 2. TECHNICAL DESCRIPTION

### 2.1. GENERAL

The gearbox is designed to be a compact tool with low submerged weight to enable efficient ROV intervention. As base case, the gearbox is intended to be used as a stand-alone unit for installation in Class 5 interfaces. Once installed, the Class 4 torque tool, hereafter referred to as TT, shall be inserted in the Class 4 interface of the gearbox. The unit is then ready for operation.

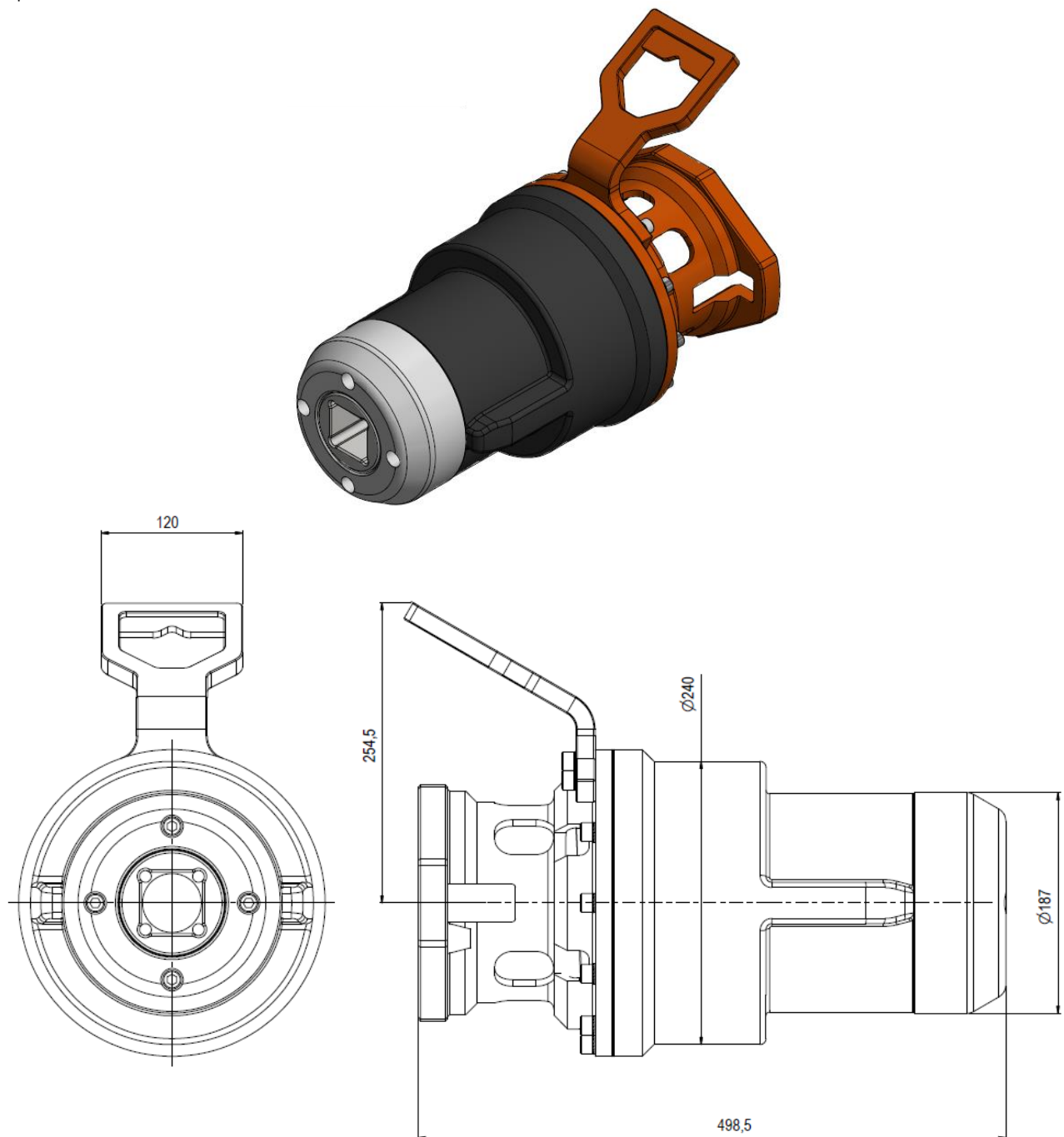
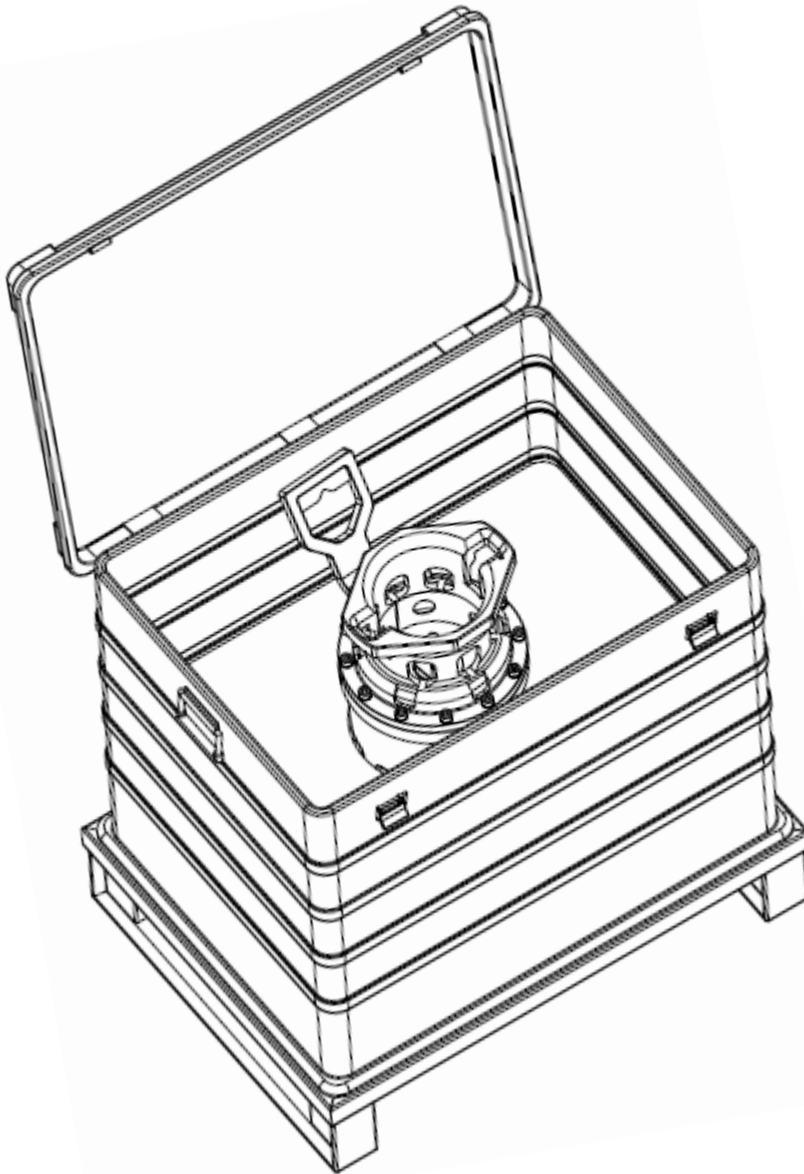


Figure 1, Cl.5 gearbox



*Figure 2 Class 5 gearbox, complete kit (BB2406)*

The gearbox is delivered in a transport box, containing required accessories and spares.

## 2.2. INTERFACES

### 2.2.1. Mechanical Interface

Torque Input:

- ISO/API Class 4

Torque Output:

- ISO/API Class 5

ROV Interface:

- ROV D-handle

### 2.2.2. Hydraulic Interface

The gearbox is all-mechanical, but the housing is pressure compensated using an oil-filled ½” Tygon compensator hose. Blind fitting at the end of the hose to be pulled out for filling/draining of compensation hose. Make sure to evacuate all air when filling with oil.  
Gear-oil: Q8 T 65 75W-90.

## 2.3. MATERIAL SELECTION

The gearbox is mainly constructed in anodized Aluminium, and designed for intervention, i.e. not permanent installation

## 2.4. TECHNICAL DATA

Overall dimensions	Ø260 x 499 mm
Weight in air	41,4 kg
Weight in water	28,6 kg
Pressure rating	300 bar
Max water depth	3 000 m
Max output, gear ratio 1:2,5	6,7 kNm
Max output, gear ratio 1:3,78	10 kNm
Gear-oil	Q8 T 65 75W-90

### 3. OPERATION

#### 3.1. PREPARATIONS

Prior to operation, the following actions shall be carried out.

ID	Description
1	Check the gearbox for damages.
2	Verify correct output interface selected. Replace output interface if required, ref. section 3.4.
3	Insert the Class 4 TT and operate gearbox to verify smooth and correct operation.
4	Put the gearbox in vertical position with the Class 4 interface up. Verify that the compensation hose is oil filled. Evacuate any air if present.

#### 3.2. OPERATION

ID	Description
1	<b>Grab the gearbox' D-handle</b> and use the manipulator to install the gearbox into the correct Class 5 intervention bucket. The gearbox can be used in both vertical and horizontal orientation. The gearbox is held in position by gravity/friction, thus no locking mechanism to be engaged. Alignment of output socket may be necessary for fully insertion.
2	Insert the Class 4 TT and slowly operate in required direction in order to align <b>the gearbox' output socket with the Class 5</b> interface. In vertical orientation, the gearbox will drop into final position once aligned. For horizontal orientation, the ROV must apply a gentle push during the alignment.
3	Perform intervention as required for the application.
4	When operation has been completed, remove the Class 4 TT.
5	Grab the D-handle and pull the gearbox out of the Class 5 interface bucket.



### 3.3. PRE-OPERATION

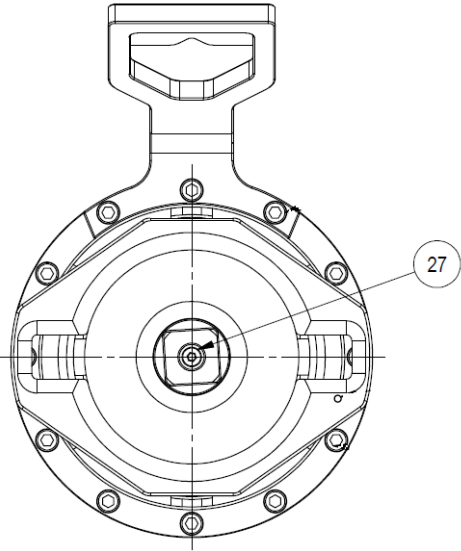
The following actions shall be taken once the gearbox has been recovered to deck.

ID	Description
1	Hose down the gearbox using fresh water.
2	Check for damages, special attention to be made to input and output interfaces.
3	Put the tool in vertical orientation and verify that the compensation hose is completely oil-filled. Refill if required.
4	Insert the Class 4 TT and operate the gearbox to verify correct and smooth operation.
5	Wipe off any water and install the gearbox in dedicated transport box.



TECHNICAL DOCUMENT

- 4. MAINTENANCE
- 4.1. YEARLY MAINTENANCE

ID	Description	
1	Check gearbox for damages, special attention to be made to input and output interfaces.	
2	Check coating, touch-up if required.	
3	Remove the plastic protection plate inside the class 4 bucket and pull out the compensation hose. Remove the end-plug from the hose.	
4	Unscrew BSP plug (item 27) at the input stem. Remove plug inserted in the compensation hose to allow draining. Check oil for contamination, debris, water etc.	
5	Put the tool in vertical position with the CI4 interface upwards. Connect an oil-pump to the compensation hose and pump oil until it bleeds out of the BSP port. Reinstall the BSP plug.	Gear-oil: Q8 T 65 75W-90
6	Check for bubbles of air in compensation hose. Use vacuum pump to evacuate any trapped air and refill oil if required.	
7	Disconnect the oil-pump and reinstall the plug for the compensation hose.	



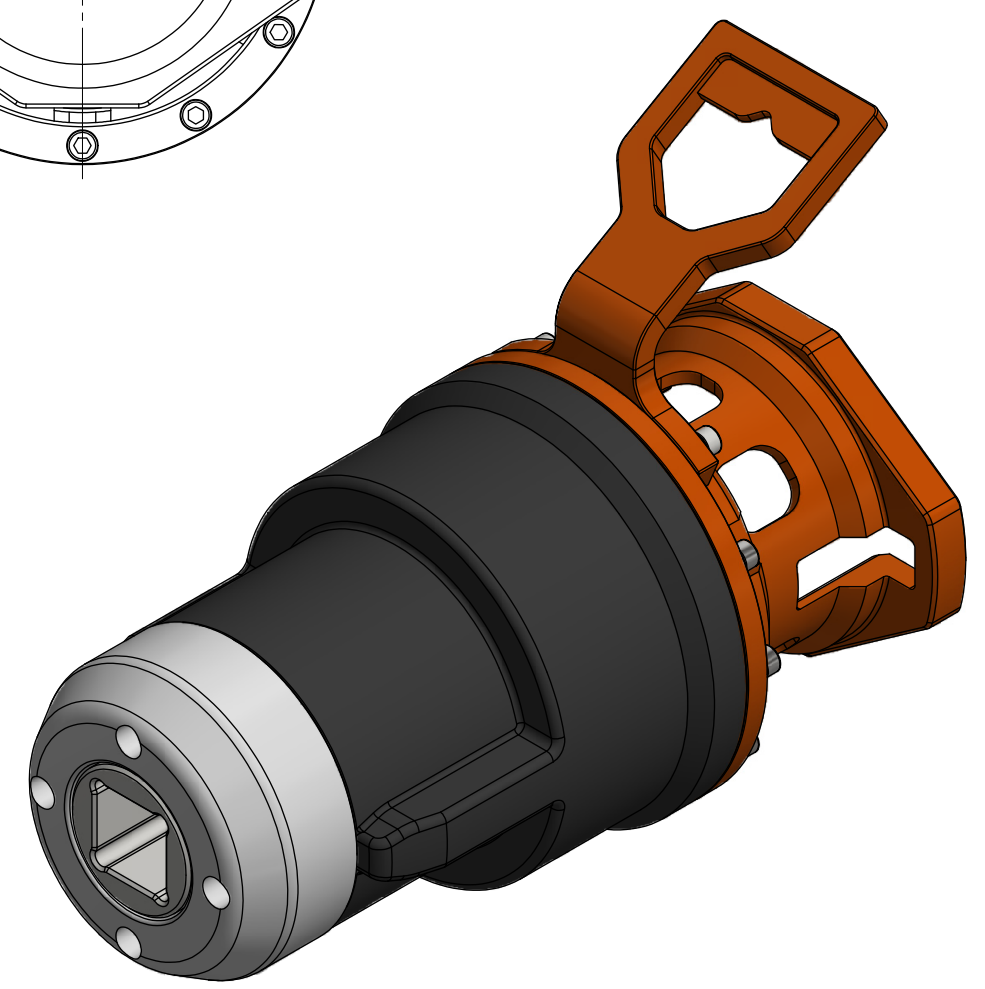
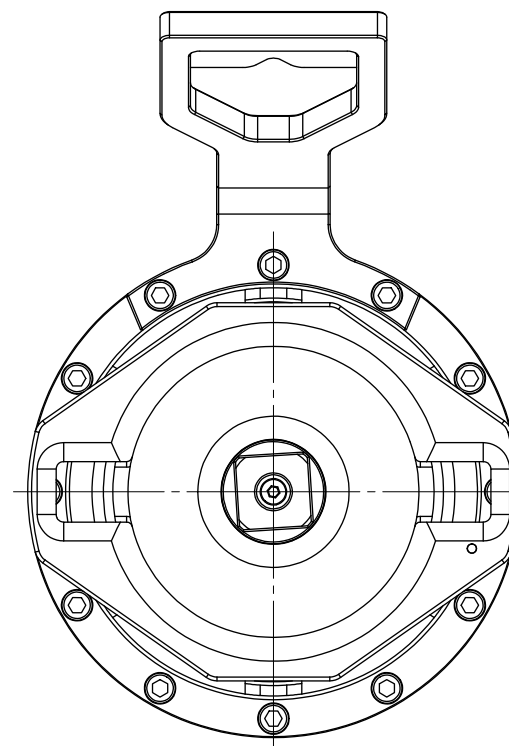
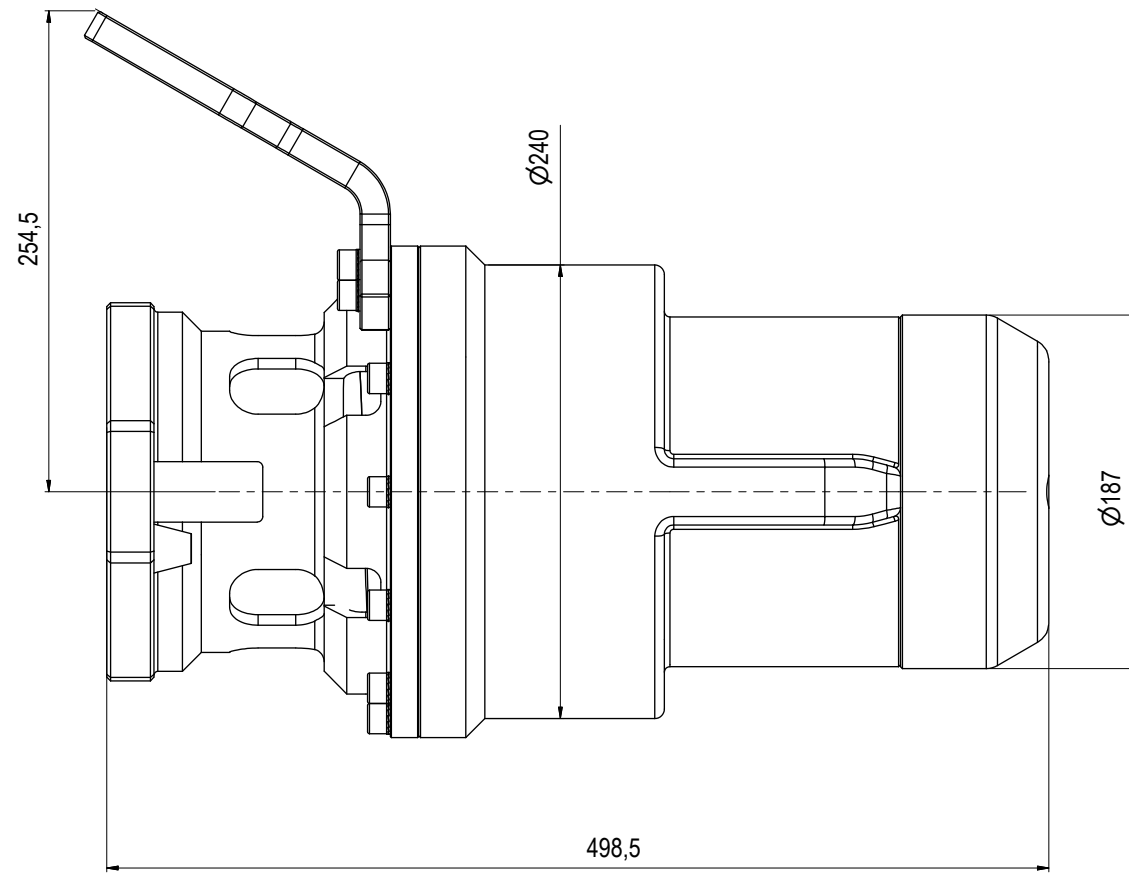
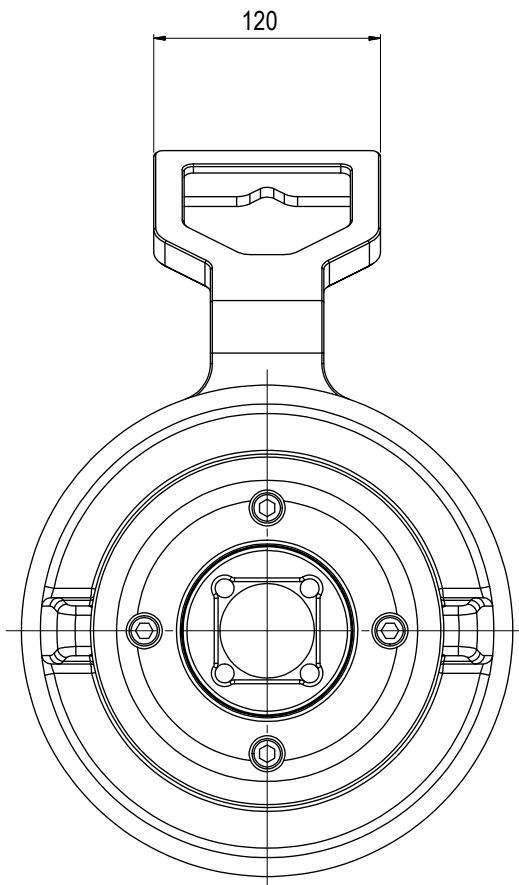
#### 4.2. 2-YEARLY MAINTENANCE

If the gearbox has been in operation for 2 years, it should be returned to Blue Logic for full inspection and maintenance.

ID	Description	
1	Check gearbox for damages, special attention to be made to input and output interfaces.	
2	Check coating, touch-up if required.	
3	Drain all oil through the BSP port. Inspect oil for water, debris etc.	
4	Open gearbox and perform a full inspection of all internal parts, gears etc. Replace parts and seals if required.	
5	Assemble gearbox and fill with oil.	Gear-oil: Q8 T 65 75W-90
6	Perform function test to verify full functionality.	

APPENDIX 1 DRAWINGS

BA7652	Class 5 Gear Box
BB2406	Gear Box Cl. 5 Arrangement (Kit)



NOTE: 1  
 DESIGN CODE:  
 ISO 13628-8 (E)

NOTE: 2  
 TECHNICAL CLASSIFICATION:  
 Article Type: 008-Actuation  
 Main Group: 8.02. ISO-5 Actuation  
 Intermediate Group: 8.45.03. Gear  
 Sub Group: 8.45.127.02. Intervention

NOTE: 3  
 INTERFACE INFORMATION:  
 Pressure Rating Bar: 300  
 Design Water Depth: 3000m  
 Material: N/A  
 Weight in Air: 41,4 kg  
 Volume: 12,51 dm<sup>3</sup>  
 Submerged Weight: 28,55 kg  
 Surface Area: 26970 cm<sup>2</sup>  
 Hydraulic: N/A  
 Mechanical: ISO Class 4 Input, ISO Class 5 Output  
 Electrical: N/A  
 Com. & Protocol: N/A

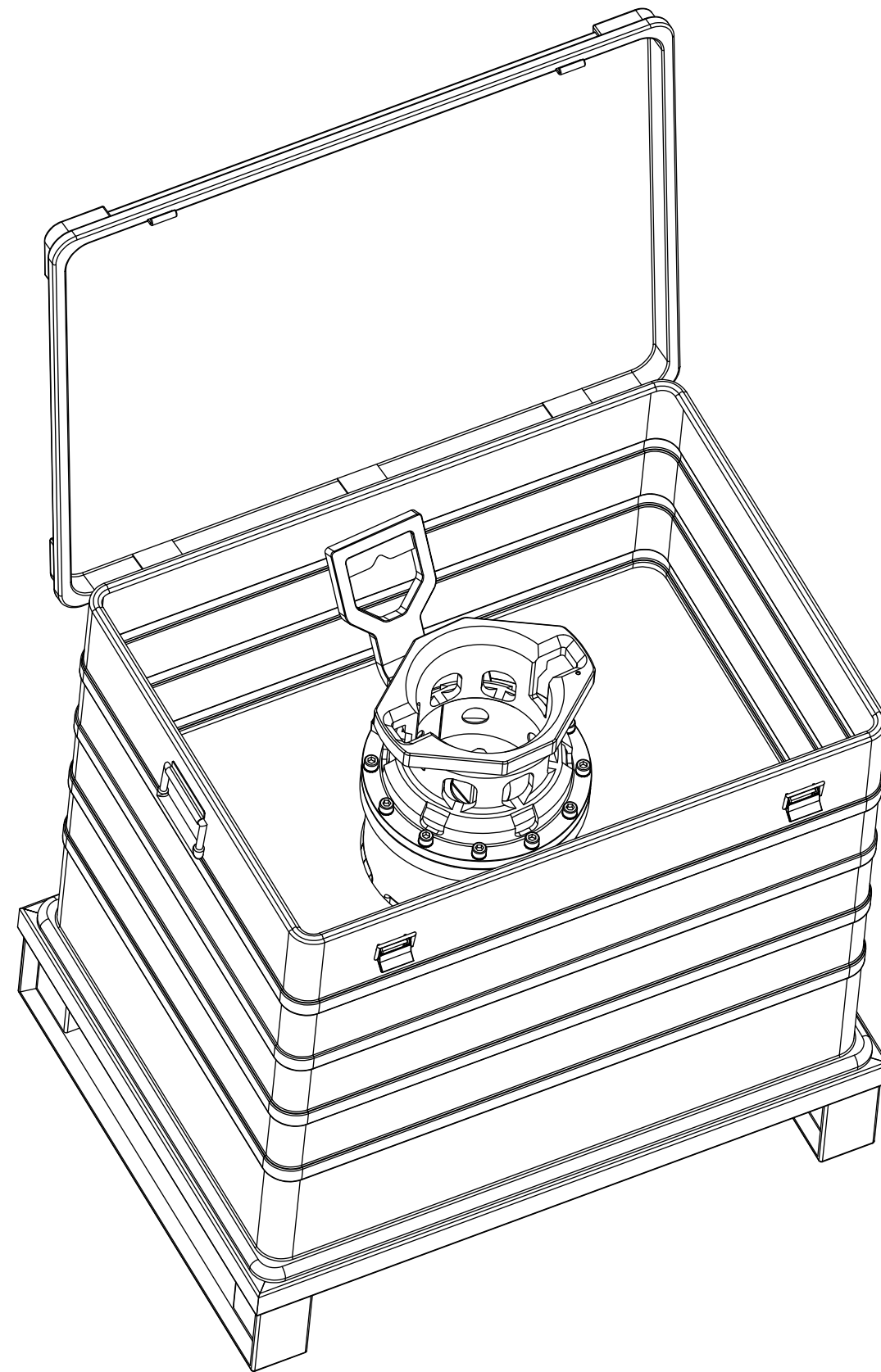
NOTE: 4  
 ADDITIONAL INFORMATION:  
 Mechanical Gear Box with ISO Class 5 Output.  
 Gear Ratio 10kNm 1:3,78

05	25.10.2022	7-IFC (Issued for Construction)		WTJ	LGH	WTJ
04	11.2.2022	7-IFC (Issued for Construction)		WTJ	KHA	WTJ
03	26.8.2021	7-IFC (Issued for Construction)		WTJ	LGH	WTJ
02	8.1.2021	7-IFC (Issued for Construction)		WTJ	HNJ	LGH
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale:	NTS
Dwg Proj:	
Dwg Format:	A3

Drawing title:	Class 5 Gear Box	
Drawing number:	BA7652	Rev: 05



NOTE: 1  
STANDARDS:  
ISO 13628-8 / API 17H


NOTE: 2  
INTERFACE INFORMATION:  
Hydraulic: N/A  
Mechanical: ISO Class 4 input / ISO Class 5 output  
Electrical: N/A  
Data Com.: N/A

NOTE: 3  
PROPERTIES:  
Material Class: N/A  
Temperature Class: N/A  
Rated Work Press Bar: 300  
Test Pressure: N/A  
Specification Level: N/A  
Flow Rate: N/A  
Qualification: N/A  
Application: ISO Class 5  
Load Rating: N/A  
Torque Rating: 6 750Nm  
Design Water Depth: 3000m  
Weight in Air: 60,8 kg  
Volume: 127,84 dm<sup>3</sup>  
Submerged Weight: -70,28 kg

NOTE: 4  
ADDITIONAL INFORMATION:  
Mechanical Gear Box with ISO Class 4 input and ISO Class 5 output.  
Maximum torque 6 750kNm.  
Gear ratio 2,5:1

Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.
01	3.5.2022	7-IFC (Issued for Construction)		WTJ	KHA	WTJ



Dwg Scale:  
NTS  
Dwg Proj:   
Dwg Format:  
A3

Drawing title:  
Gear Box Cl. 5 Arrangement

Drawing number:  
BB2406

Rev.  
01