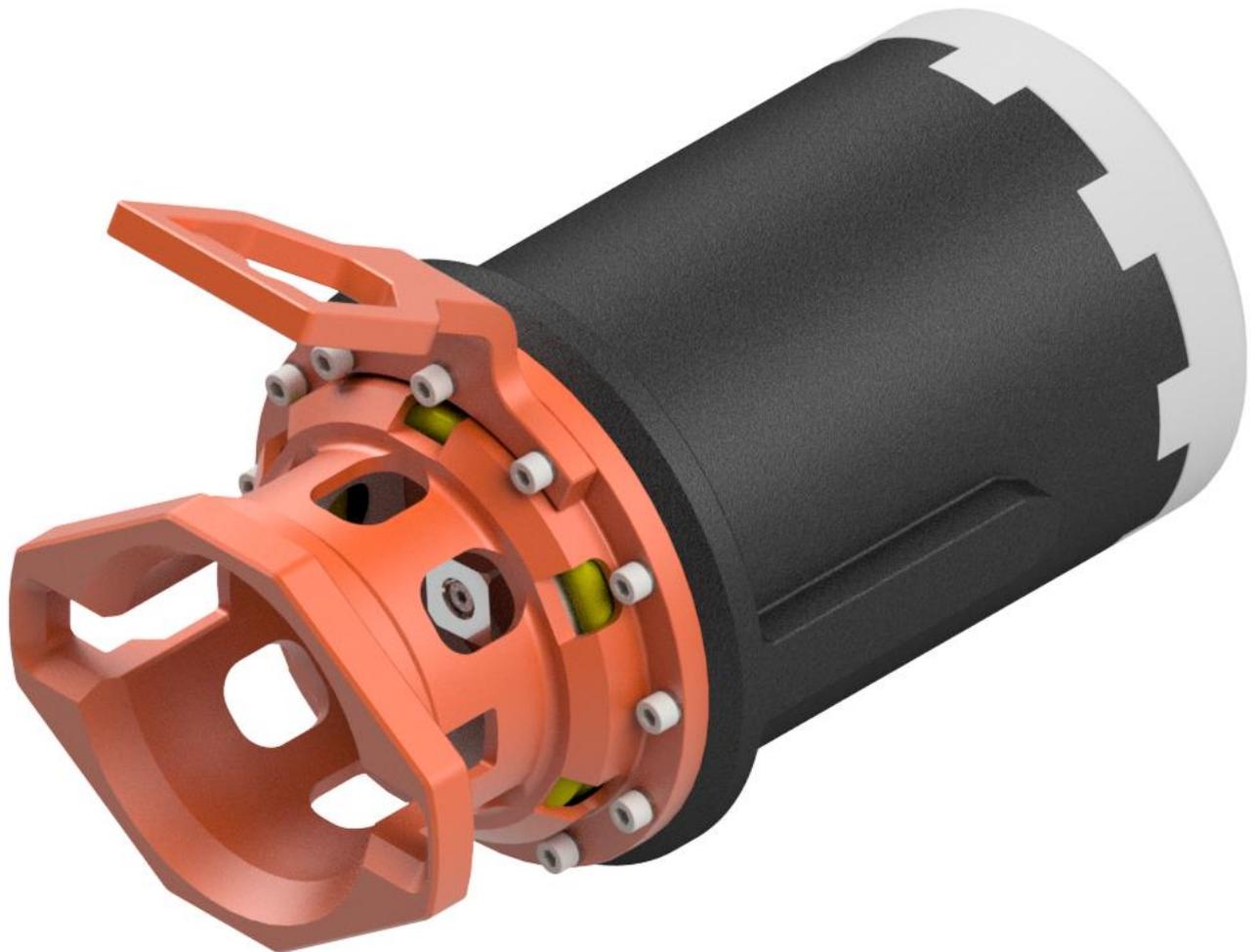




TECHNICAL DOCUMENT

DOCUMENT TITLE: Operation & Maintenance Manual for Gear Box Cl. 7
PROJECT TITLE: 8.3. ISO-6&7-Mech.Interfaces
PROJECT: 600146
DOCUMENT NUMBER: 600146-TD-0006
REV: 01
NUMBER OF PAGES: 1 of 19

DATE: 21.09.2022
CLIENT: N/A
CLIENT PO: N/A
CLIENT CONTACT: N/A





OBJECTIVE

The objective of this document is to present a comprehensive technical description of the Blue Logic Class 7 Gearbox. Relevant technical aspects for information and familiarization are covered as well as detailed technical data. For further information reference is made to drawing BB2408 Gear Box Cl.7

ABSTRACT

The Blue Logic Gear Box Cl. 7 is designed in accordance with ISO/API, and the purpose is to enable operation of equipment with Class 7 interface using a torque tool with Class 4 output interface.

REVISION CHANGE/RECORD

REV	REASON FOR REVISION/ DESCRIPTION OF CHANGES
01	Issued for Use
02	Added information regarding 10kNm & 15kNm versions



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1. INTRODUCTION

The Class 7 Gearbox is designed to enable operation of Class 7 and Class 6 interfaces using a Class 4 torque tool for maximum flexibility at minimum cost.

The gearbox can be configured for both short and long Class 7 interface, in addition to Class 6 using a square insert.

The gearbox can be delivered as a complete kit(BB2408), including required components to adapt the tool to the interfaces as described above.

The Gearboxes are delivered as 40kNm(BA6403), 15kNm(BA6847) & 10kNm(BA8497) 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 7 Gearbox.

1.2. REFERENCES

Latest version of the following documents

Id.	Doc. No	Originator	Document Title
/01/	BB2408	Blue Logic	Gear Box Cl.7 Arrangement
/02/	BA6403	Blue Logic	Class 7 Gear Box 40kNm
/03/	BA6847	Blue Logic	Class 7 Gear Box 15kNm
/04/	BA8497	Blue Logic	Class 7 Gear Box 10kNm
/05/	BB1677	Blue Logic	Class 7 Gear Box 40kNm Long*
/06/	600146-TD-0009	Blue Logic	Assembly and Test Procedure for Class 6&7 Gearbox

* Dimensions for “long version” are similar for 10kNm & 15kNm

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 7 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.

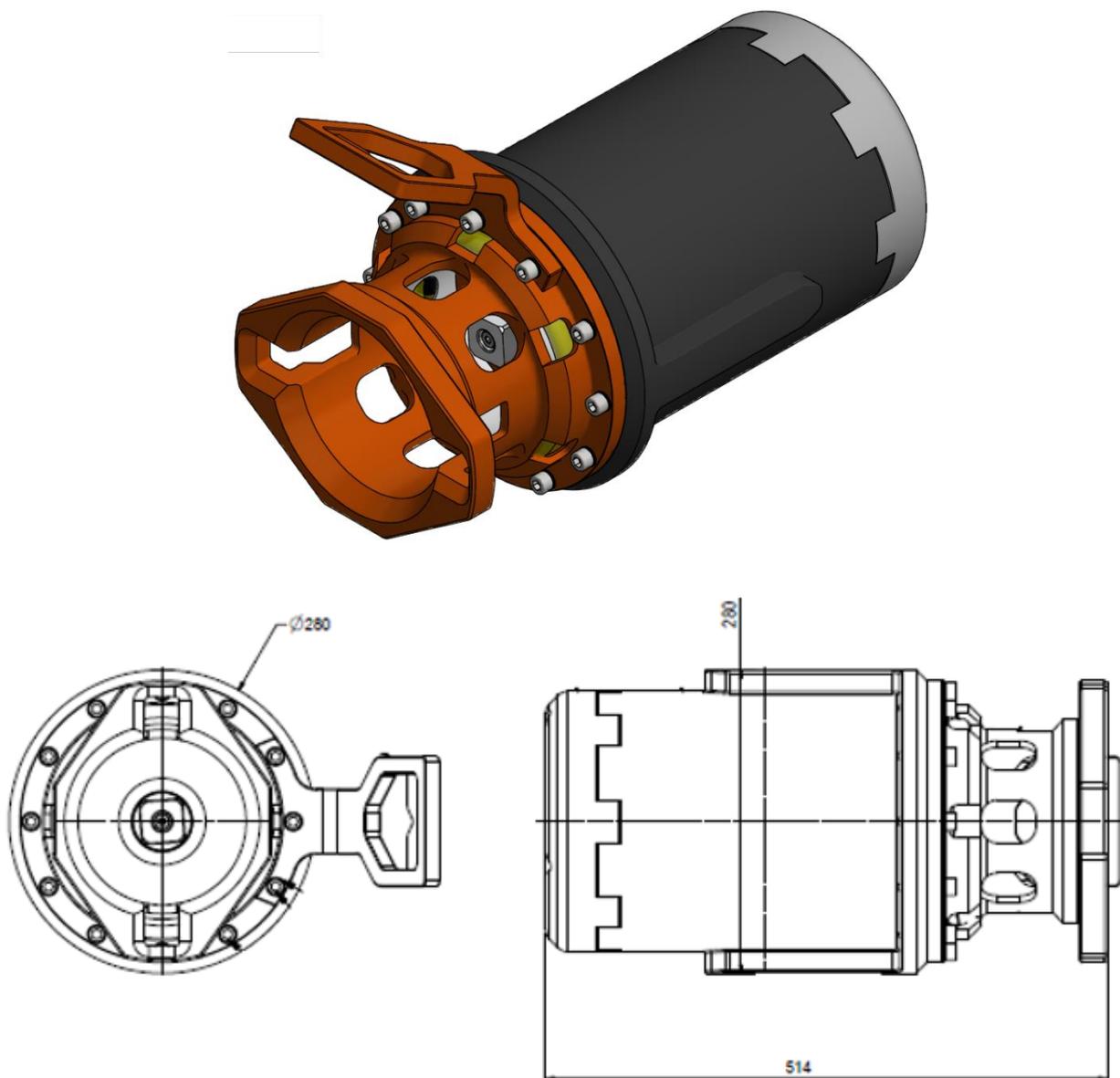


Figure 1, CI.7 gearbox, short configuration

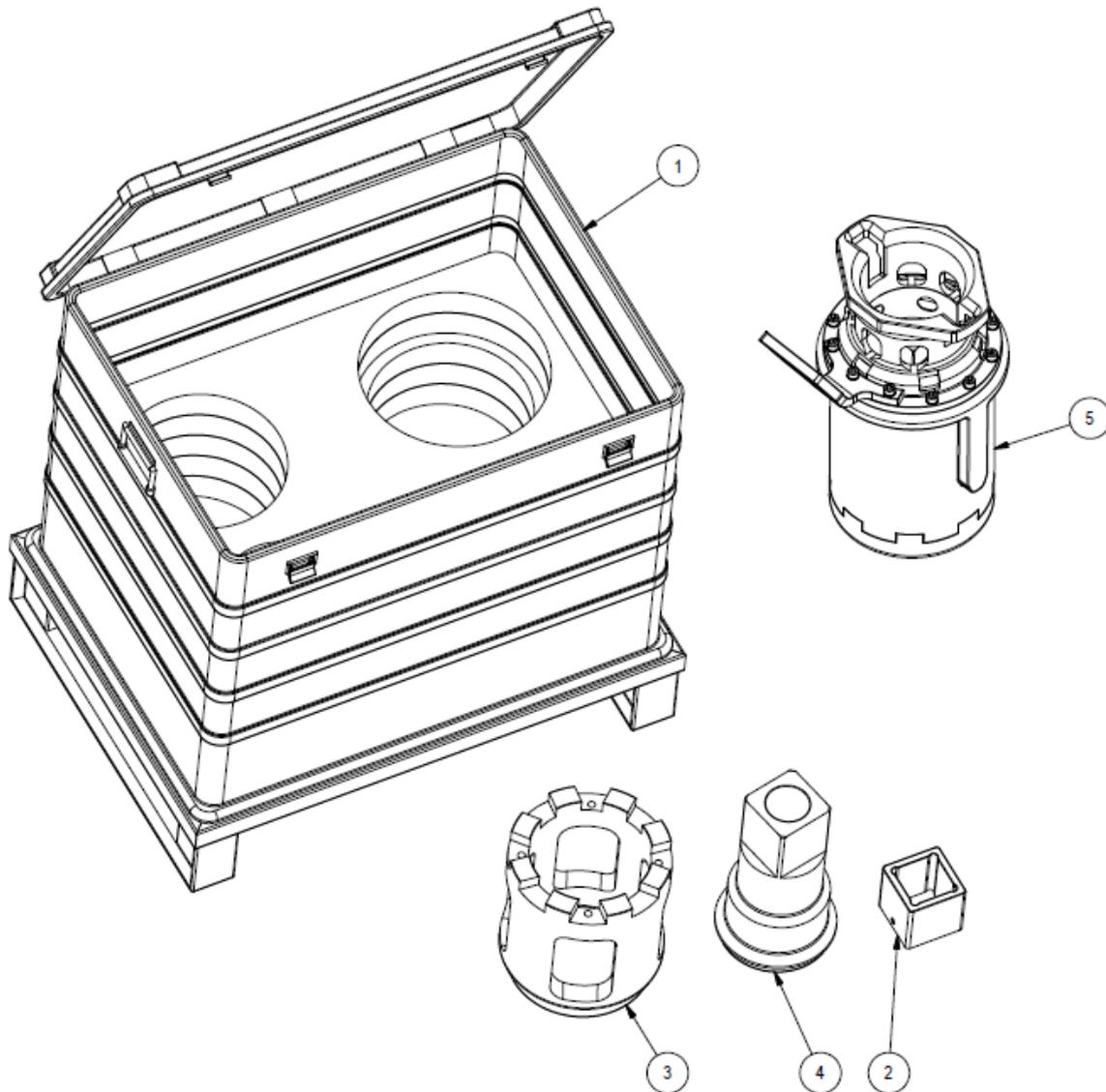


Figure 2 Class 7 gearbox, complete kit (BB2408)

The gearbox can be delivered in a transport box, containing the following main components as shown above: The gearbox can be delivered in 10kNm or 15kNm, with the same accessories.

Item	Description	Reference
1	Transport box	BB3819
2	Insert Class 6	BB1680
3	Protection Nose Class 7 - Long	BB1679
4	Planetary Carrier Class 7 Extension - Long	BB1678
5	Class 7 Gear Box 40kNm - Short	BA6403
6	Operation and Maintenance Manual	600146-TD-0006

2.2. INTERFACES

2.2.1. Mechanical Interface

Torque Input:

- ISO/API Class 4

Torque Output:

- ISO/API Class 7 – short
- ISO/API Class 7 – long
- ISO/API Class 6

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

The below data represents a standard, short, version of the gearbox.

Overall dimensions	Ø280 x 514 mm
Weight in air	71.1 kg
Weight in water	56,94 kg
Pressure rating	300 bar
Max water depth	3 000 m
Max output, gear ratio 1:14,273	40 kNm
Max output, gear ratio 1:6	15 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	Grab the gearbox' D-handle and use the manipulator to install the gearbox into the correct Class 7 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 the gearbox' output socket with the Class 7 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 7 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.

3.4. REPLACEMENT OF OUTPUT INTERFACE

For increased flexibility, the output interface is interchangeable to fit different interfaces;

- Class 7 short
- Class 7 long
- Class 6 short
- Class 6 long

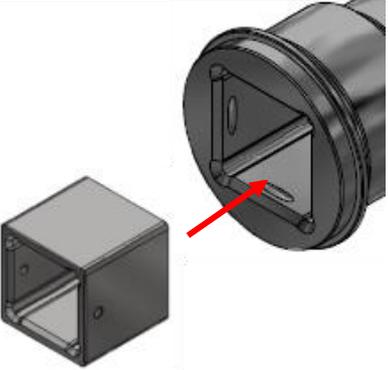
Please follow below instructions for changing between the above listed configurations.

3.4.1. Change from Short to Long Nose

ID	Description	
1	Use an Allen key to release 4 off M10x40 bolts and remove the protection nose.	
2	Insert the extension socket, BB1678, into the main socket.	
3	Install the extended protection nose, BB1679. Install and tighten all M10x40 bolts, 4 off. Torque: 43Nm	
4		

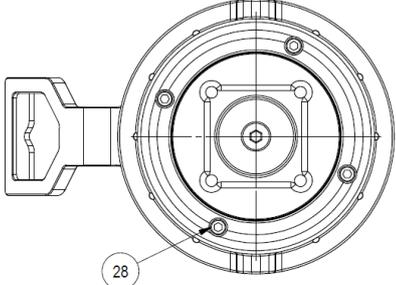
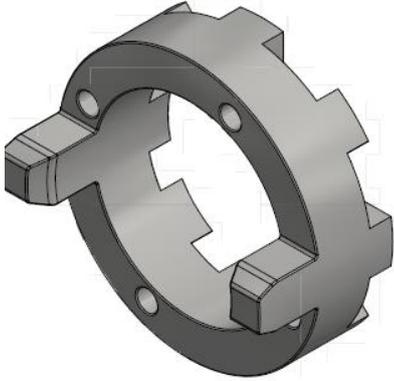
3.4.2. Installation of Class 6 Insert

The below procedure provides information of how to install the Class 6 insert socket.

ID	Description	
1	Insert the Class 6 insert socket, BB1680, into the Class 7 socket.	
2	Install 2 off M10 set screws and secure the insert to the main socket.	

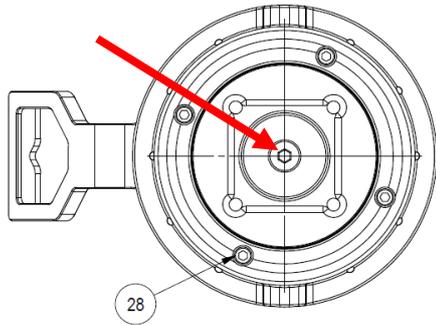
3.4.3. Installation of GH0 adapter

To install the GH0 adapter (Art. Nr.: BB5605), follow the instructions below.

ID	Description	
1	Use an Allen key to release 4 off M10x40 bolts and remove the protection nose.	
2	Install the GH0 adapter, BB5605, and tighten all M10x40 bolts, 4 off. Torque: 43Nm	
3		



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 inside the socket. 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 CI7 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	Put the gearbox in vertical orientation with the CI4 interface upwards. 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.	



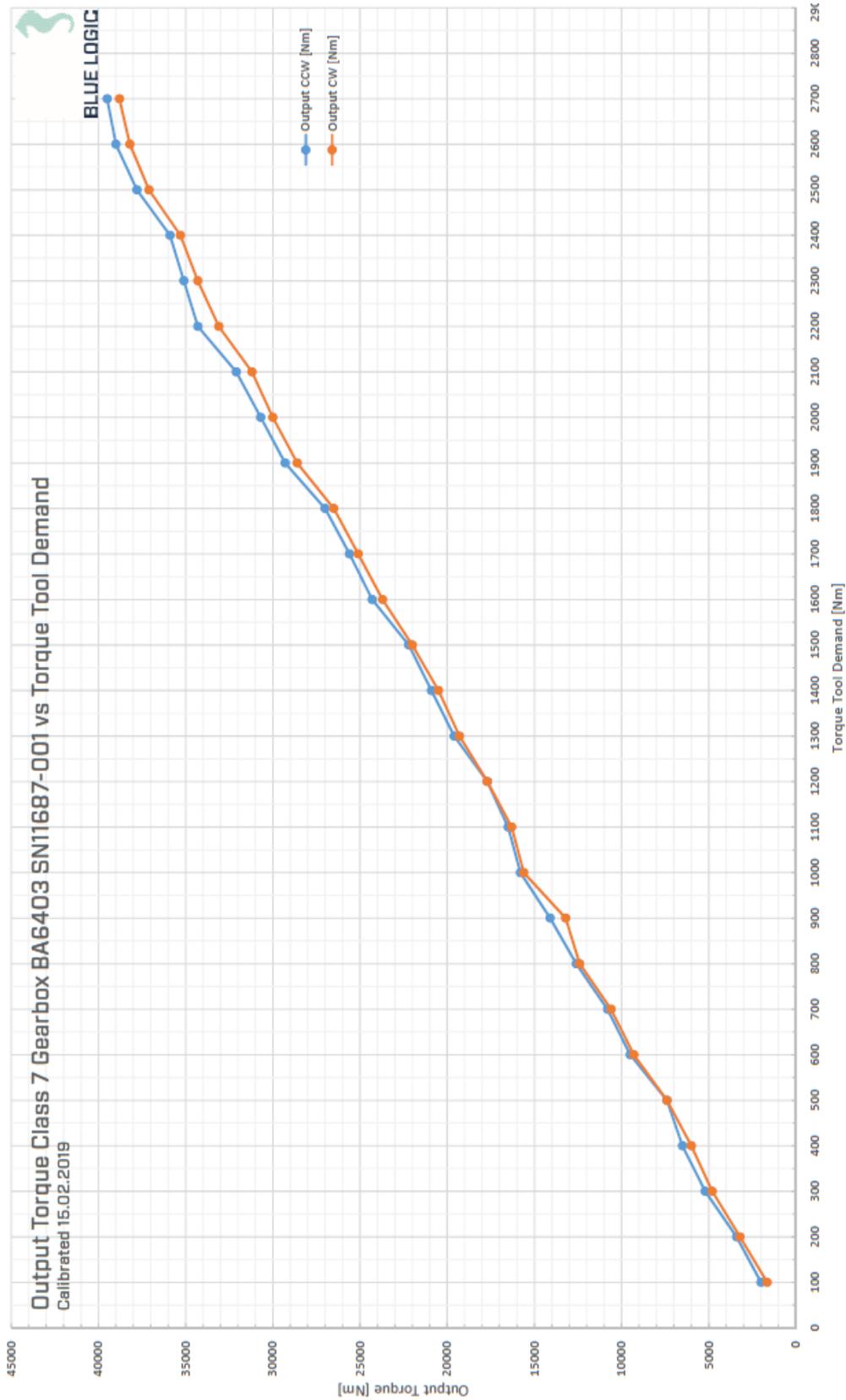
4.3. 2-YEARLY MAINTNEANCE

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.	



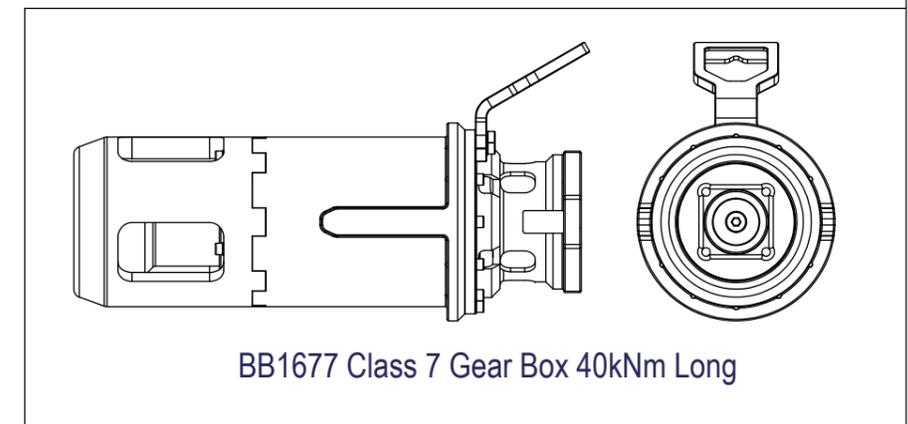
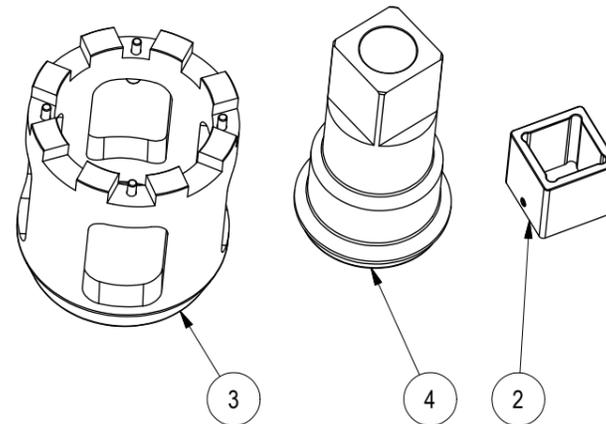
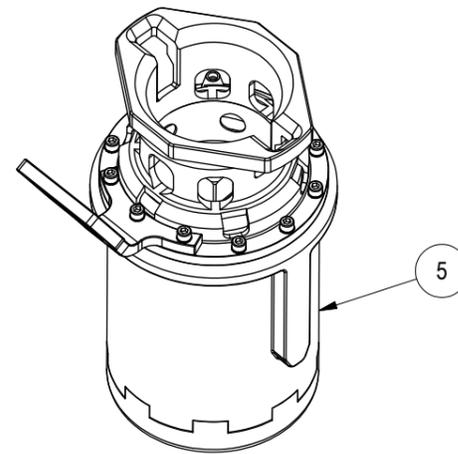
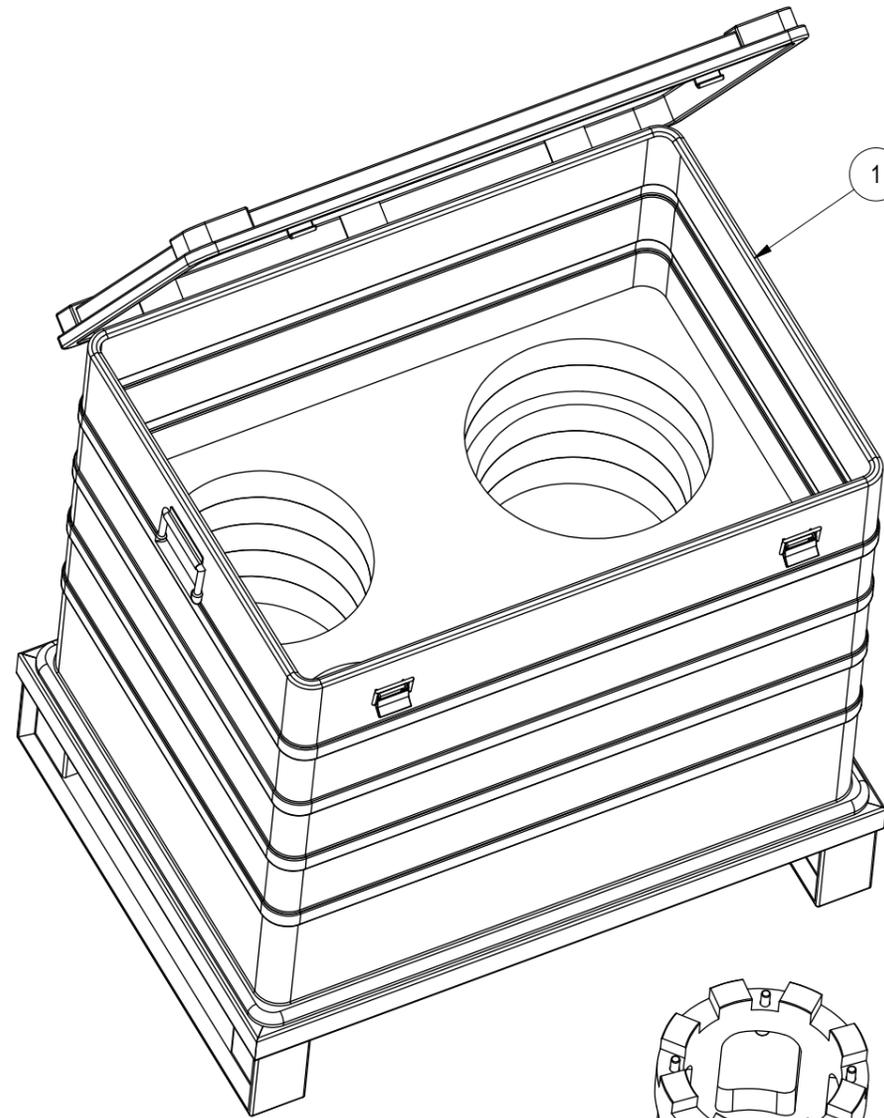
5. APPENDIX 1 – TORQUE CURVE



6. APPENDIX 2 – GEARBOX CL.7 ARRANGEMENT DWG

Drawing BB2408

Parts List					
ITEM	QTY	PART No.	TITLE	WEBLINK	
1	1	BB3819	Alu Box Assy for Gear Box Cl. 7	N/A	
2	1	BB1680	Insert Class 6	N/A	
3	1	BB1679	Protection Nose Class 7 Long	N/A	
4	1	BB1678	Plantary Carrier Class 7 Extension Long	N/A	
5	1	BA6403	Class 7 Gear Box 40kNm	http://e-sea.bluelogic.no/main.aspx?page=article&artno=BA6403	



NOTE: 1
 DESIGN CODE:
 ISO 13628-8/API 17H

NOTE: 2
 TECHNICAL CLASSIFICATION:
 Article Type: 008-Actuation
 Main Group: 8.03. ISO-6-7 Actuation
 Intermediate Group: 8.46.04. Test Jig
 Sub Group: 8.46.134.02. Intervention

NOTE: 3
 INTERFACE INFORMATION:
 Pressure Rating Bar: 300
 Material: N/A
 Weight: 115,7 kg
 Volume: 132,77 dm³
 Surface Area: 154062 cm²
 Hydraulic: N/A
 Mechanical: ISO/API 17H Class 4 and Class 7
 Electrical: N/A
 Com. & Protocol: N/A

NOTE: 4
 ADDITIONAL INFORMATION:
 Mechanical Gear box with ISO Class 4 input and ISO Class 7 output
 40kNm torque capacity.
 The gearbox can be configured for Class 7 short and long.
 A square insert is delivered to also meet Class 6 dimensions.
 Gear ratio can be either 14.31:1, 6.0:1 or 3.79:1 for maximum flexibility.

03	12.7.2021	9-IFU (Issued for Use)		WTJ	KHA	WTJ
02	10.9.2019	9-IFU (Issued for Use)		WTJ	LGH	WTJ
01	6.9.2018	2-IFT (Issued for Tender)		WTJ	N/A	N/A
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale:	NTS
Dwg Proj:	
Dwg Format:	A3

Drawing title:	Gear Box Cl. 7 Arrangement	
Drawing number:	BB2408	Rev: 03

7. APPENDIX 3 – CLASS 7 GEARBOX 40KNM SHORT

Drawing BA6403

NOTE: 1
 DESIGN CODE:
 API 17H

NOTE: 2
 TECHNICAL CLASSIFICATION:
 Article Type: 008-Actuation
 Main Group: 8.03. ISO-6-7 Actuation
 Intermediate Group: 8.46.03. Gear
 Sub Group: 8.46.128.02. Intervention

NOTE: 3
 INTERFACE INFORMATION:
 Pressure Rating Bar: 300
 Design Water Depth: 3000m
 Material: N/A
 Weight: 71,1 kg
 Volume: 13,83 dm³
 Submerged Weight: 56,92 kg
 Surface Area: 30578 cm²
 Hydraulic: N/A
 Mechanical: ISO Class 4 Input
 Electrical: N/A
 Com. & Protocol: N/A

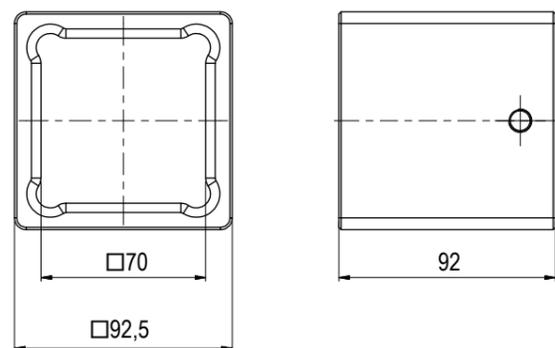
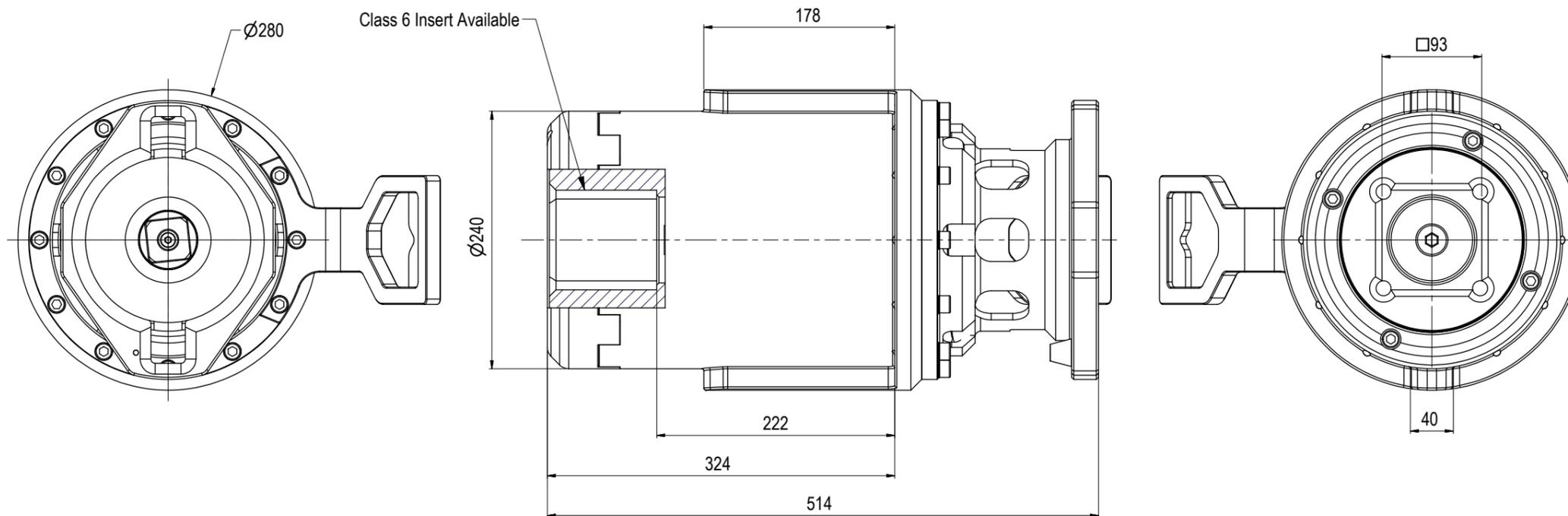
NOTE: 4
 ADDITIONAL INFORMATION:
 API 17H Class 4 to 7 gearbox for short term use / intervention.
 The gearbox is oil filled and pressure compensated using passive, integrated compensator. Main housing constructed in hard anodized Aluminum, nose section in POM and output socket in S165M.

Mechanical Gear box with ISO Class 4 input and ISO Class 7 output. 40kNm torque capacity.
 Gear Ratio 40kNm 1:14.273

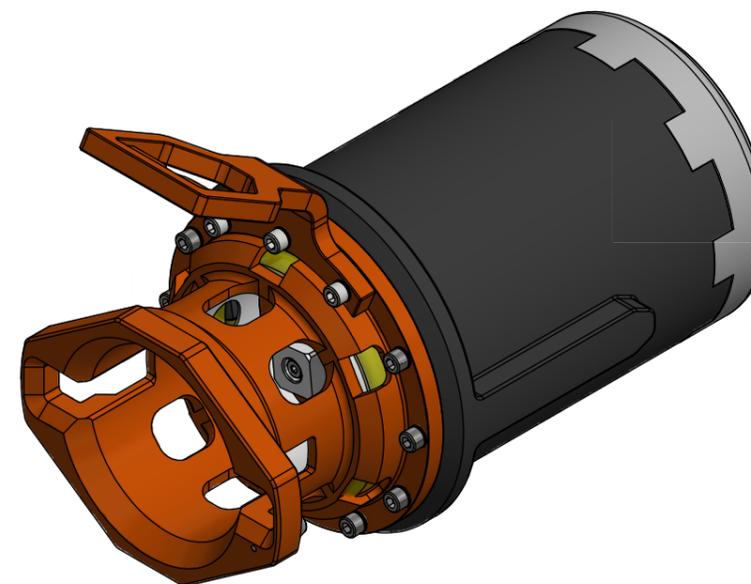
Class 6 Insert available on request, BB1680

Can be configured to 10kNm and 15kNm torque output.
 Gear Ratio 15kNm 1:6 (ref BA6847)
 Gear Ratio 10kNm 1:3,78 (ref BA8497)

Gear Ratio 40kNm Long 1:14.273 (ref BB1677)



CLASS 6 INSERT BB1680



11	24.8.2022	9-IFU (Issued for Use)		WTJ	LGH	WTJ
10	11.2.2022	9-IFU (Issued for Use)		WTJ	KHA	WTJ
09	26.8.2021	9-IFU (Issued for Use)		WTJ	LGH	WTJ
08	16.4.2021	9-IFU (Issued for Use)		WTJ	LGH	WTJ
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale:
 NTS
 Dwg Proj:
 Dwg Format:
 A3

Drawing title:
 Class 7 Gear Box 40kNm

Drawing number:
 BA6403

Rev.
 11

8. APPENDIX 4 - CLASS 7 GEARBOX 40KNM LONG

Drawing BB1677

NOTE: 1
 DESIGN CODE:
 API 17H

NOTE: 2
 TECHNICAL CLASSIFICATION:
 Article Type: 008-Actuation
 Main Group: 8.03. ISO-6-7 Actuation
 Intermediate Group: 8.46.03. Gear
 Sub Group: 8.46.128.02. Intervention

NOTE: 3
 INTERFACE INFORMATION:
 Pressure Rating Bar: 300
 Design Water Depth: 3000m
 Material: N/A
 Weight: 93,9 kg
 Volume: 19,46 dm³
 Submerged Weight: 73,95 kg
 Surface Area: 36574 cm²
 Hydraulic: N/A
 Mechanical: ISO Class 4 Input
 Electrical: N/A
 Com. & Protocol: N/A

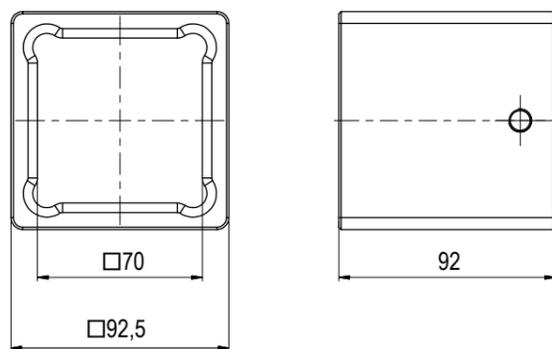
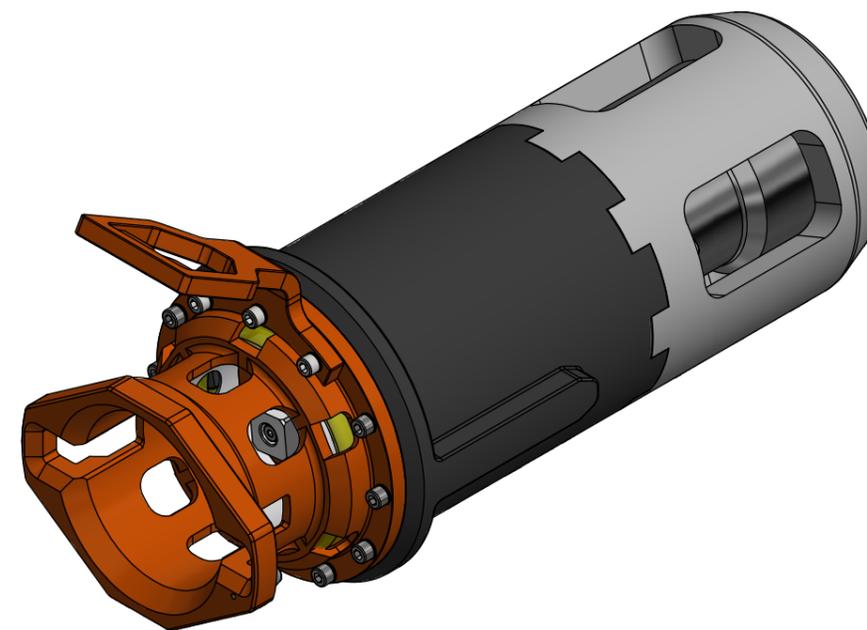
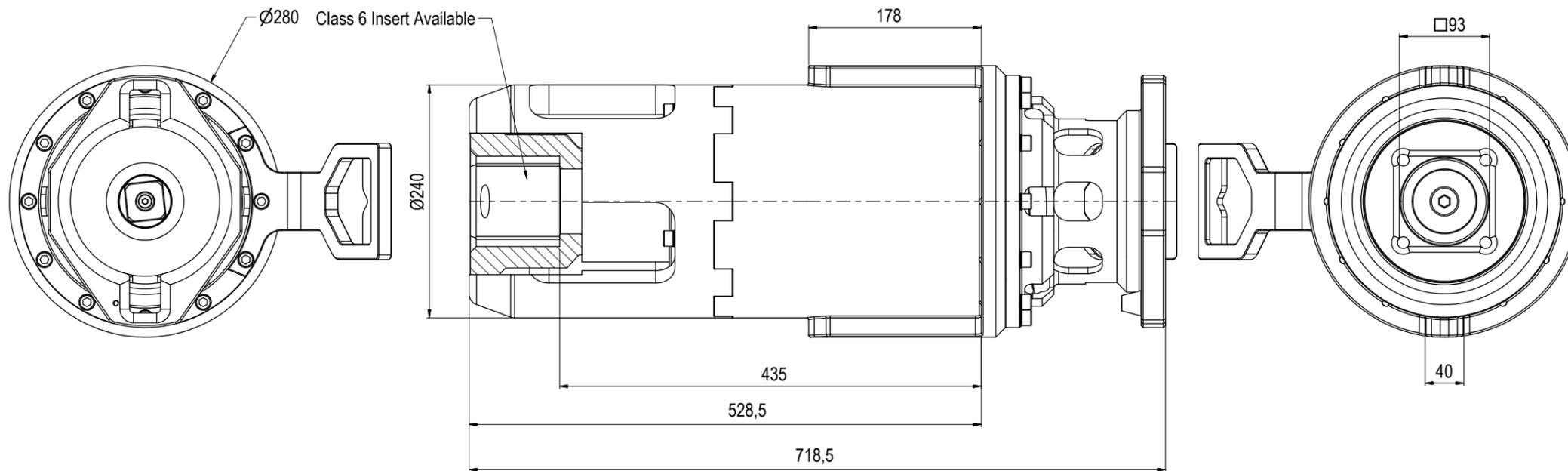
NOTE: 4
 ADDITIONAL INFORMATION:
 API 17H Class 4 to 7 gearbox short term use / intervention.
 The gearbox is oil filled and pressure compensated using passive integrated compensator. Main housing constructed in hard anodized Aluminum, nose section in POM and output socket in S165M.

Mechanical Gear box with ISO Class 4 input and ISO Class 7 output. 40kNm torque capacity.
 Gear Ratio 40kNm 1:14.273

Class 6 Insert available on request, BB1680

Can be configured to 10kNm and 15kNm torque output.
 Gear Ratio 15kNm 1:6
 Gear Ratio 10kNm 1:3,78

Gear Ratio 10kNm Short 1:3,78 (ref BA8497)
 Gear Ratio 15kNm Short 1:6 (ref BA6847)
 Gear Ratio 40kNm Short 1:14.273 (ref BA6403)



CLASS 6 INSERT BB1680

06	24.8.2022	9-IFU (Issued for Use)		WTJ	LGH	WTJ
05	11.2.2022	9-IFU (Issued for Use)		WTJ	KHA	WTJ
04	7.7.2021	9-IFU (Issued for Use)		WTJ	LGH	WTJ
03	16.10.2019	9-IFU (Issued for Use)		WTJ	LGH	WTJ
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale:
 NTS
 Dwg Proj:
 Dwg Format:
 A3

Drawing title:
 Class 7 Gear Box 40kNm Long

Drawing number:
 BB1677

Rev:
 06

9. APPENDIX 5 - CLASS 7 GEAR BOX 15KNM

DWG: BA6847

NOTE: 1
 DESIGN CODE:
 API 17H

NOTE: 2
 TECHNICAL CLASSIFICATION:
 Article Type: 008-Actuation
 Main Group: 8.03. ISO-6-7 Actuation
 Intermediate Group: 8.46.03. Gear
 Sub Group: 8.46.128.02. Intervention

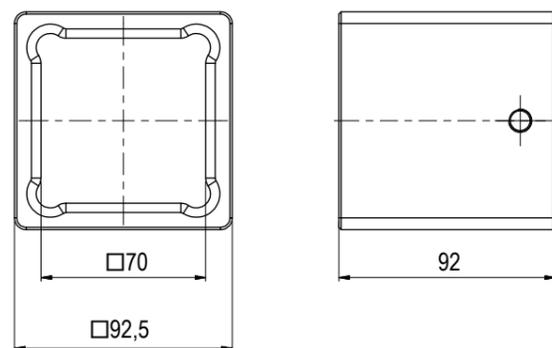
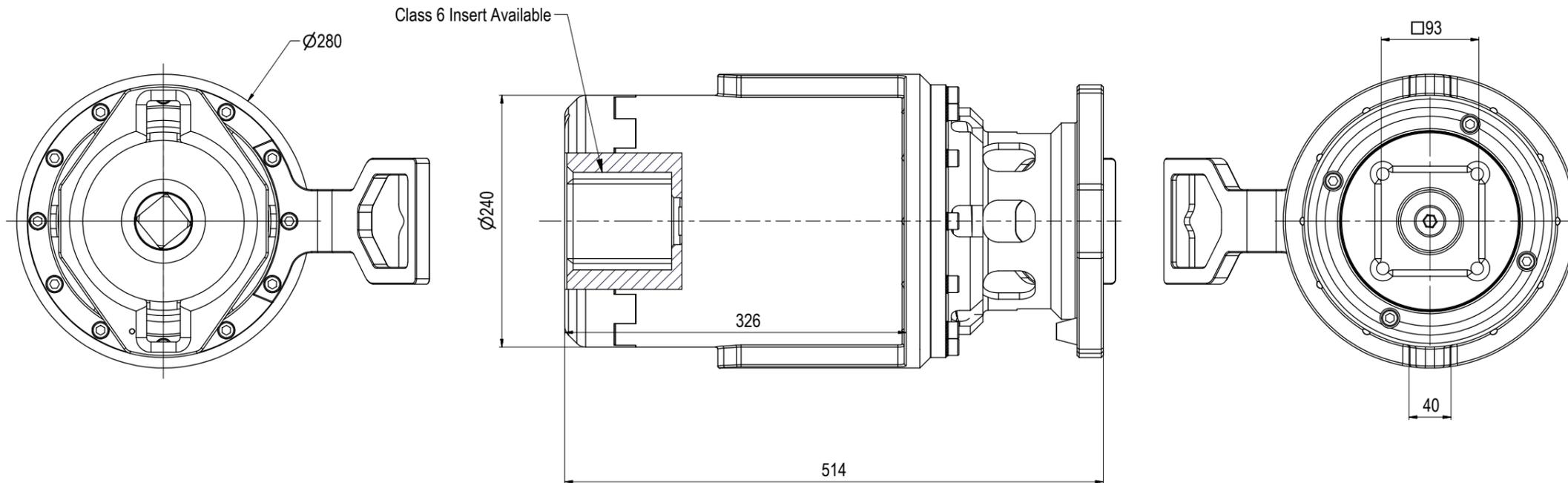
NOTE: 3
 INTERFACE INFORMATION:
 Pressure Rating Bar: 300
 Design Water Depth: 3000m
 Material: N/A
 Weight in Air: 62,7 kg
 Volume: 12,83 dm³
 Submerged Weight: 49,59 kg
 Surface Area: 26069 cm²
 Hydraulic: N/A
 Mechanical: ISO Class 4 Input
 Electrical: N/A
 Com. & Protocol: N/A

NOTE: 4
 ADDITIONAL INFORMATION:
 API 17H Class 4 to 7 gearbox for short term use / intervention.
 The gearbox is oil filled and pressure compensated using passive, integrated compensator. Main housing constructed in hard anodized Aluminum, nose section in POM and output socket in S165M.

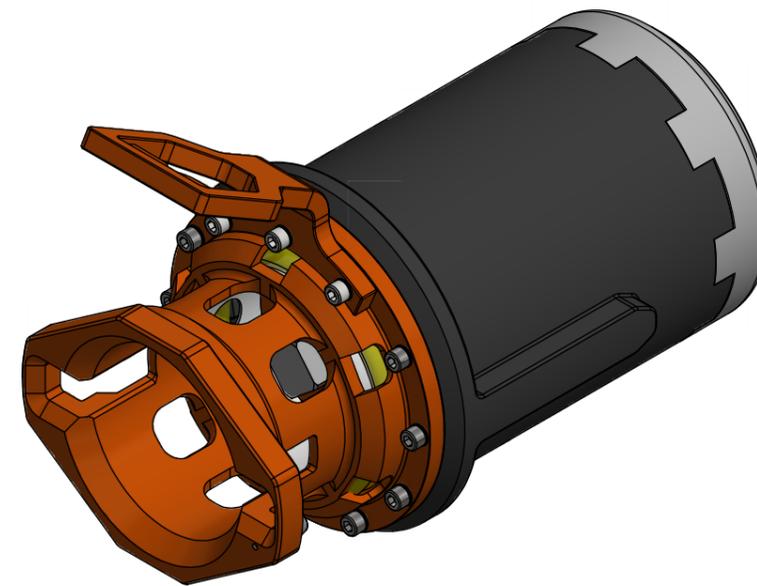
Mechanical Gear box with ISO Class 4 input and ISO Class 7 output. 15kNm torque capacity.
 Gear Ratio 15kNm 1:6

Can be configured to 10kNm and 40kNm torque output.
 Gear Ratio 10kNm 1:3,78 (ref BA8497)
 Gear Ratio 40kNm 1:14.273 (ref BA6403)

Gear Ratio 40kNm Long 1:14.273 (ref BB1677)



CLASS 6 INSERT BB1680



09	24.8.2022	9-IFU (Issued for Use)		WTJ	LGH	WTJ
08	11.2.2022	9-IFU (Issued for Use)		WTJ	KHA	WTJ
07	26.8.2021	9-IFU (Issued for Use)		WTJ	LGH	WTJ
06	19.3.2021	9-IFU (Issued for Use)		WTJ	LGH	WTJ
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale: NTS
 Dwg Proj: 
 Dwg Format: A3

Drawing title:
 Class 7 Gear Box 15kNm

Drawing number:
 BA6847

Rev:
 09

10. APPENDIX 6 - CLASS 7 GEAR BOX 10KNM

DWG: BA8497

NOTE: 1
 DESIGN CODE:
 API 17H

NOTE: 2
 TECHNICAL CLASSIFICATION:
 Article Type: 008-Actuation
 Main Group: 8.03. ISO-6-7 Actuation
 Intermediate Group: 8.46.03. Gear
 Sub Group: 8.46.128.02. Intervention

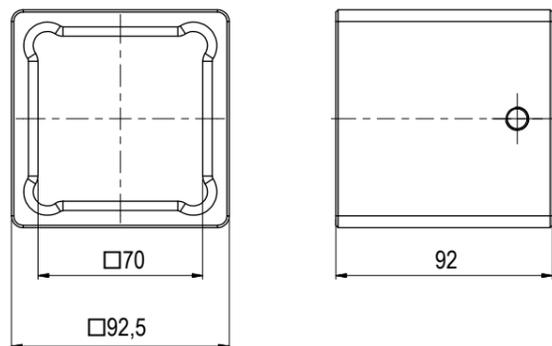
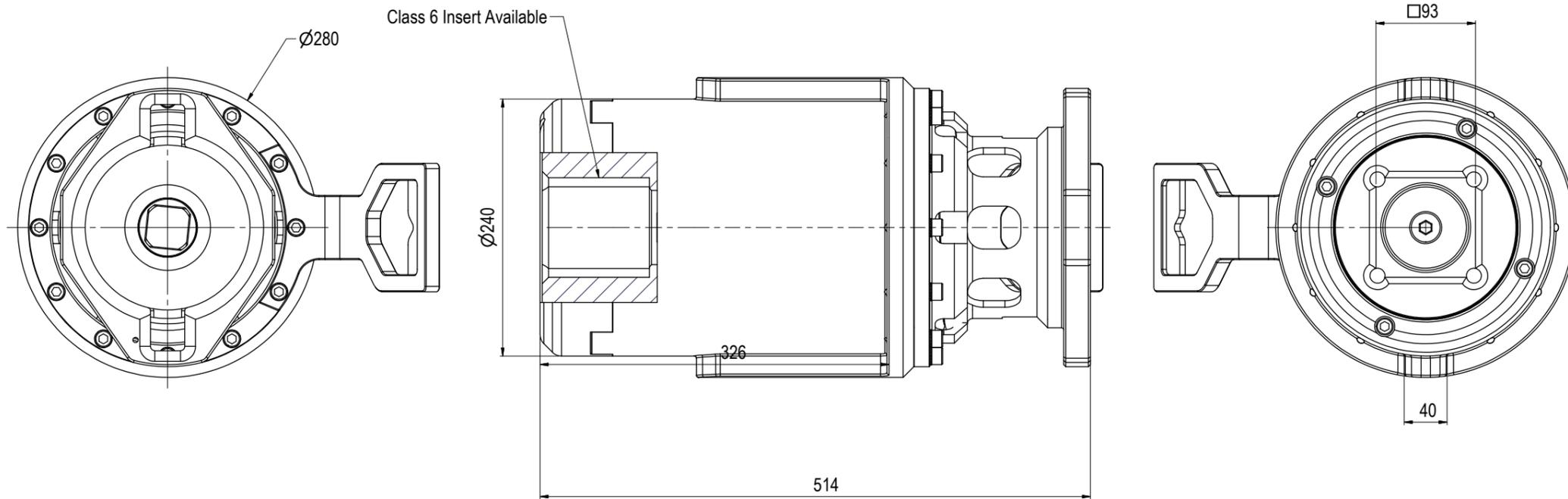
NOTE: 3
 INTERFACE INFORMATION:
 Pressure Rating Bar: 300
 Design Water Depth: 3000m
 Material: N/A
 Weight in Air: 61,6 kg
 Volume: 12,68 dm³
 Submerged Weight: 48,58 kg
 Surface Area: 26298 cm²
 Hydraulic: N/A
 Mechanical: ISO Class 4 Input
 Electrical: N/A
 Com. & Protocol: N/A

NOTE: 4
 ADDITIONAL INFORMATION:
 API 17H Class 4 to 7 gearbox for short term use / intervention.
 The gearbox is oil filled and pressure compensated using passive, integrated compensator. Main housing constructed in hard anodized Aluminum, nose section in POM and output socket in S165M.

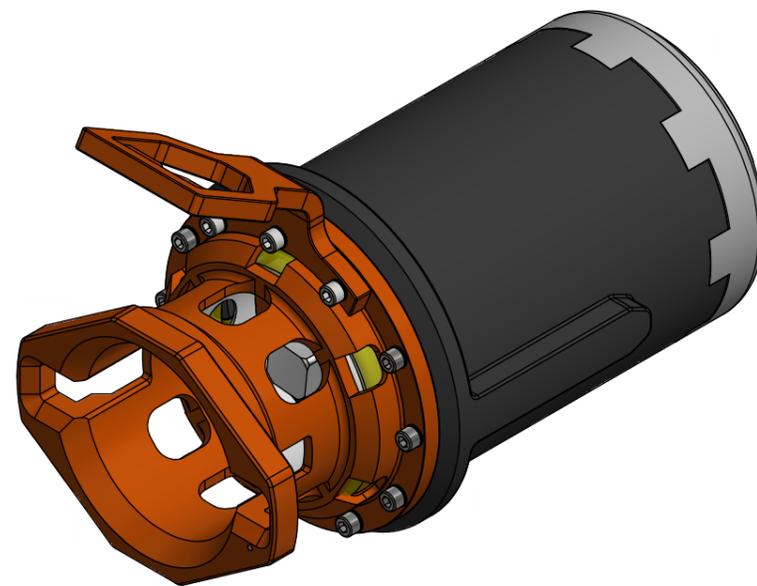
Mechanical Gear box with ISO Class 4 input and ISO Class 7 output. 10kNm torque capacity.
 Gear Ratio 10kNm 1:3,78

Can be configured to 15kNm and 40kNm torque output.
 Gear Ratio 15kNm 1:6 (ref BA6847)
 Gear Ratio 40kNm 1:14.273 (ref BA6403)

Gear Ratio 40kNm Long 1:14.273 (ref BB1677)



CLASS 6 INSERT BB1680



05	24.8.2022	9-IFU (Issued for Use)		WTJ	LGH	WTJ
04	11.2.2022	9-IFU (Issued for Use)		WTJ	KHA	WTJ
03	27.10.2021	9-IFU (Issued for Use)		WTJ	LGH	WTJ
02	18.10.2019	9-IFU (Issued for Use)		WTJ	LGH	WTJ
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale:	NTS
Dwg Proj:	
Dwg Format:	A3

Drawing title:	Class 7 Gear Box 10kNm	
Drawing number:	BA8497	Rev. 05