



Ashtead
Technology

VORTEX
SUBSEA SOLUTIONS

MEDIUM DUTY
CAMERA WINCH

OPERATIONS MANUAL

VERSION 2.0 FEB 2023

VERSION	SECTION	ISSUE DATE	AUTHOR	DESCRIPTION OF UPDATE
1.0		25 March 2021	JG	First Edition
2.0		13 Feb 2023	JG	Revised Edition

VOR-MDCW-MAN:
VER 2.0

Vortex Medium Duty camera winch manual version 2.0

VORTEX INTERNATIONAL LTD

27 Parris Road, RD, New Plymouth 4371, New Zealand
 Phone/Fax + 64 6 7538102, Mobile + 64 (0) 276 88 53 72
vortexdredge.com

Contents

1.0 INTRODUCTION

1.1	Reference Documents	2
-----	---------------------	---

2.0 SAFETY

2.1	Overview	3
2.2	Risk assessment	3
2.3	Mechanical	3

3.0 TECHNICAL SPECIFICATIONS

3.1	Description	4
3.2	Features	5
3.3	Specifications	5
3.4	Drum pull and drum capacity	6
3.5	Base mounting bolts	7

4.0 OPERATIONAL PROCEDURES

4.1	Pre-dive checks tool visual check	8
4.2	Level wind – cable installation	9
4.3	Level wind – cable installation	10
4.4	Hydraulic connections	11
4.5	Hydraulic connections	12
4.6	Servicing - Winch disassembly	13
4.7	Servicing - Winch disassembly	14
4.8	Servicing - Winch disassembly	15
4.9	Servicing - Winch disassembly	16
4.10	Servicing - Winch disassembly	17
4.11	Rust preventative and lubrication	18
4.12	Slip Rings - 8 way	19
4.13	Slip Rings - 4 way	20

5.0 MAINTENANCE & STORAGE

5.1	Standard & replacement procedures	21
5.2	Shipping box storage	22

6.0 APPENDIX & REFERENCES	23-35
--------------------------------------	--------------

7.0 CONTACTS	36
---------------------	-----------

Introduction

The Vortex heavy duty camera winch is designed to carry nominal 9mm diameter cable (cable size can be changed) to operate cameras or sensors.

1.1 REFERENCE DOCUMENTS

See Appendix and references section at the end of this document for certificates and manufacturers data.

1.2 CONTACTS

For Technical queries, Comments and Feedback contact Vortex Dredge: goodinjoe@gmail.com

Safety

2.1 OVERVIEW

All local HSE procedures must be followed. Use of PPE should follow guidelines outlined with handling of potential sample. For example hazardous gas samples should have PPE appropriate to mitigate dangers associated with that gas. Safety glasses should be considered minimum requirement irrespective of potential sample. Your safety is your responsibility. Think and plan ahead accordingly.

2.2 RISK ASSESSMENT

Consult with local HSE and installation operators to identify best practice steps needed for safe operations. Identify if the task been done and implement lessons learned. JHA, permitting and toolbox talks should preclude all operations.

2.3 MECHANICAL

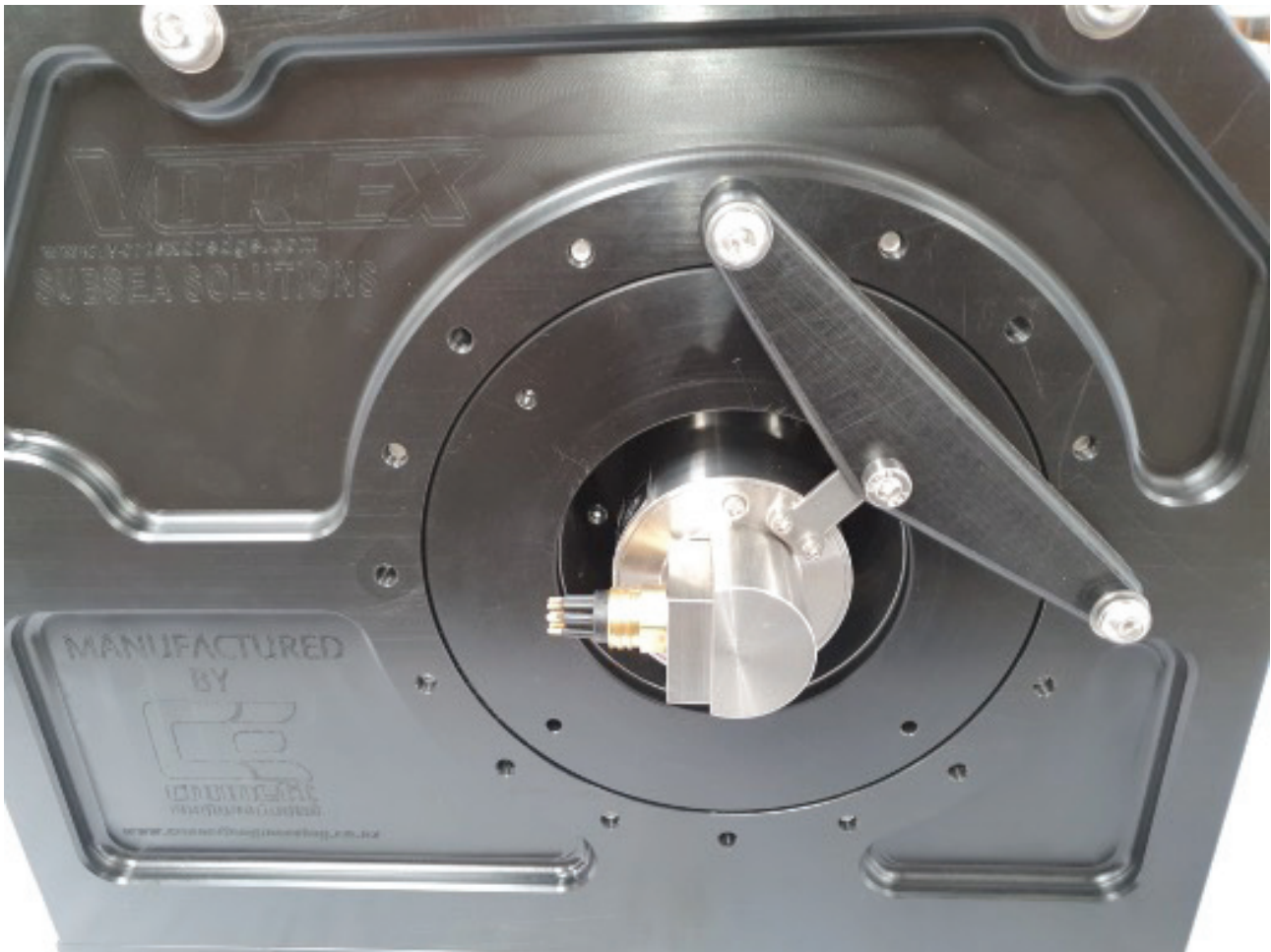
Ensure all fittings and fasteners are secure. Check general condition of tool against images in manual for anything which may indicate potential operational issues.

REMEMBER, YOUR SAFETY IS YOUR RESPONSIBILITY. THINK AND PLAN AHEAD ACCORDINGLY. IF IN DOUBT, PLEASE ASK.

Technical Specifications

3.1 DESCRIPTION

Hydraulic driven winch with electrical 8 path slip rings. 4 path also available.



Technical Specifications

3.2 FEATURES INCLUDE:

- ROV or topside hydraulics compatible.
- OMM32, 1.93 in³ / rev powerful and constant operating torque motor with 180kg capacity.
- Heavy duty worm gearbox with 40:1 gear ratio provides smooth line speed.
- Stainless steel and Acetyl construction.
- Oil filled Gearbox for operation at depth.
- load holding via worm gearbox provides controlled lowering and full load holding - no brake needed.
- Recommended for tooling packages and down hole cameras.
- Depth rating 3000mtr
- Roller fairlead

3.3 SPECIFICATIONS:

The rated line pull shown is based on the first layer of cable on the drum.

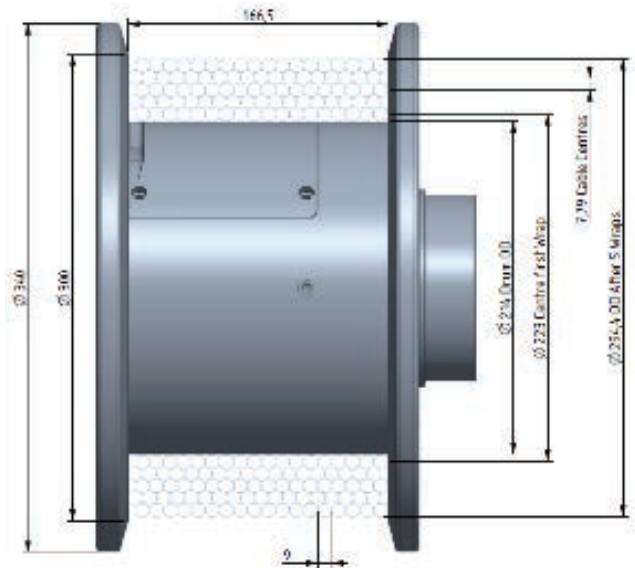
- Rated Line Pull: 200 kg / 535 lb at 1st layer of cable with 1100psi at motor.
- Line Speed in: @ 16 LPM oil flow = 10 mtr/min at fourth layer of cable @ 200kg lift
- Minimum hydraulic flow = 16 LPM
- Maximum hydraulic flow = 20 lpm
- Minimum operation Pressure: 70 bar/ 1000 psi
- Maximum operation Pressure: 103 bar/ 1500 psi
- Hydraulic Motor: OMM32 31.6 or 1.93 in³ / rev
- Gear Train: Worm drive gearbox to stainless chains and sprockets
- Gearbox and Ratio: MOTOVARIO CLEAN DUTY 40:1 GEARBOX 105X14 INPUT
- Winch Construction: Stainless steel and Acetal
- Brake: N/A. Winch uses worm drive gearbox for load holding
- Rotation of Winch: Over-wound orientation only
- Drum Barrel Diameter: 214 mm
- Drum Flange Diameter: 340 mm
- Distance Between Flanges: 166.5 mm
- Cable size Recommended: 9mm +/- 0.1 mm
- Level wind: Stainless diamond bar with integral fairlead
- Slip rings: IEC Corporation FMO-4-MC4M-MC4F and FMO-8-MC8M-MC8F stainless steel housing, Industrial quality version, Oil filled with Dow Corning 200 100 CST Oil.[https://ieccorporation.com/flange-mount/Internal Slip ring bulkhead fitting Subconn MCBH8F](https://ieccorporation.com/flange-mount/Internal%20Slip%20ring%20bulkhead%20fitting%20Subconn%20MCBH8F)
- External Slip ring bulkhead fitting Subconn MCBH8M
- Drum capacity using 9mm diameter cable: Total Including 6 Pre-Wraps = 71.9m
- Weight in air: 38kg
- Weight in fresh water: 23kg
- Dimensions: 450mm L x 376mm high x 507mm wide
- Shipping box: 670mm high x 820mm long x 820mm wide 92kg full

Technical Specifications

3.4 SPECIFICATIONS: DRUM PULL AND DRUM CAPACITY

Layer of Wire Rope	Test pull weight kg / lb	Total cable on Drum - mtr	Line speed pulling in at 16 lpm Minimum (mtr/min)	Line speed Paying out at 16 lpm Minimum (mtr/min)	Hydraulic pressure Required Bar / Psi
1st	200 / 535	8.2	10	10	75.8 / 1100

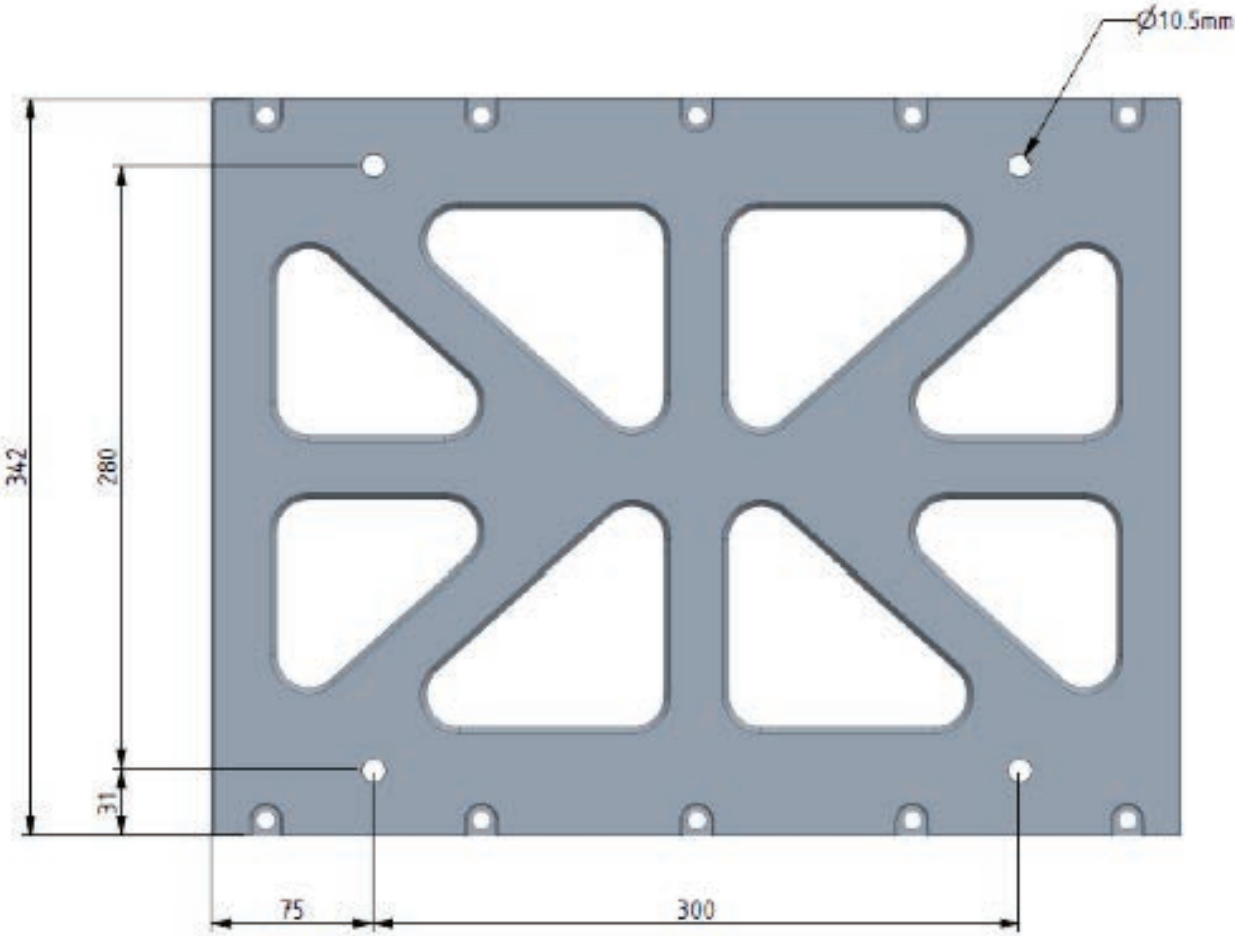
- Row 1 (6 pre-Wraps) = 4.2m @ 223
- Row 1 (12 Wraps) = 8.4m @ 223
Row 2 (18 Wraps) = 13.49m @ 238.6
- Row 3 (18 Wraps) = 14.38 @ 254.2
Row 4 (18 Wraps) = 15.26m @ 269.8
Row 5 (18 Wraps) = 16.14m @ 285.4
- OD After 5 Wraps 295
- Total Of 6 Pre-Wraps = 4.2m
- Total After 6 Pre-Wraps = 67.67m
- Total Including 6 Pre-Wraps = 71.9m



Technical Specifications

3.5 SPECIFICATIONS

Base mounting holes



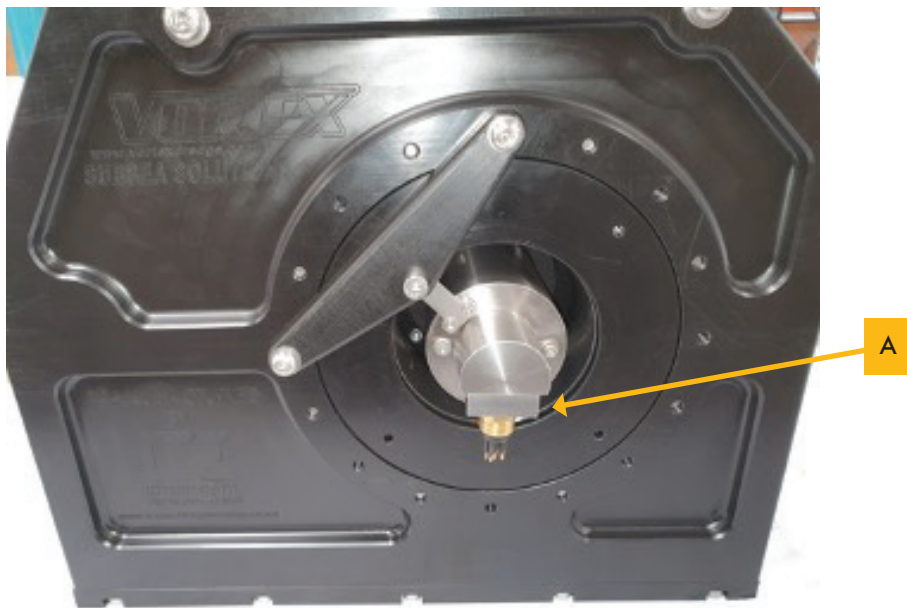
Operation Procedures

4.1 PRE DIVE CHECKS TOOL VISUAL CHECK

A) Ensure no damage to slip ring pins. Pin out from slip ring pins to cable end prior to and after deployment.

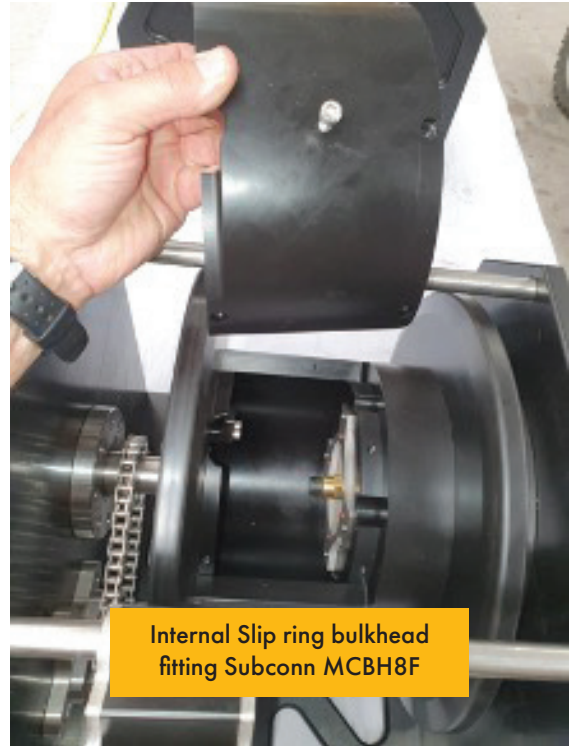
B) Ensure gearbox comp tube is near full of **OMALA S4 WE 320** or **SHELL TIVELA S 320** oil. A small air bubble is OK to allow for expansion.

Slip ring bulkhead fitting "A" Subconn MCBH8M

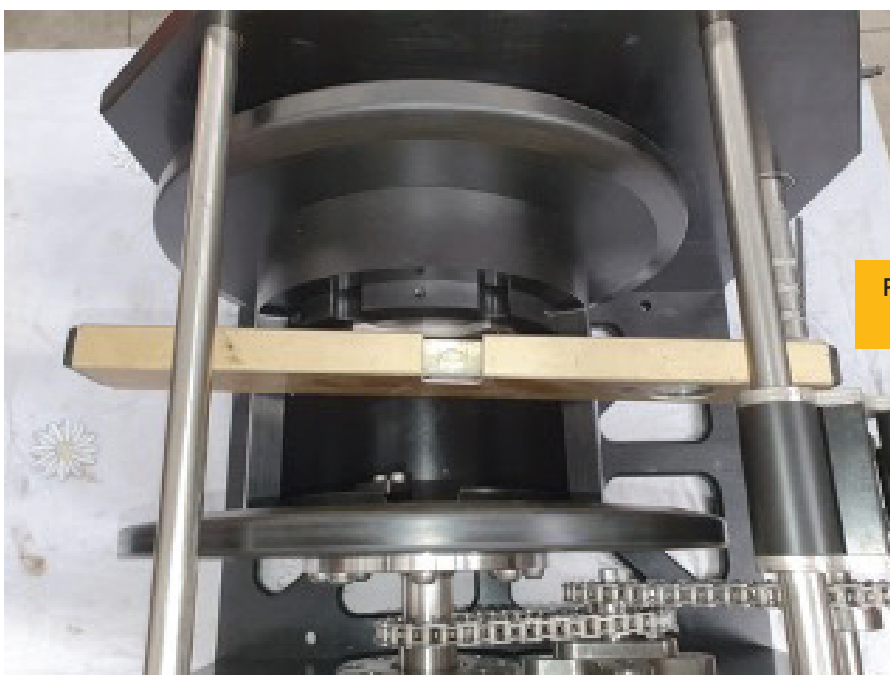


Operation Procedures

4.2 LEVEL WIND SETTING AT START OF CABLE LAY. CABLE INSTALLATION

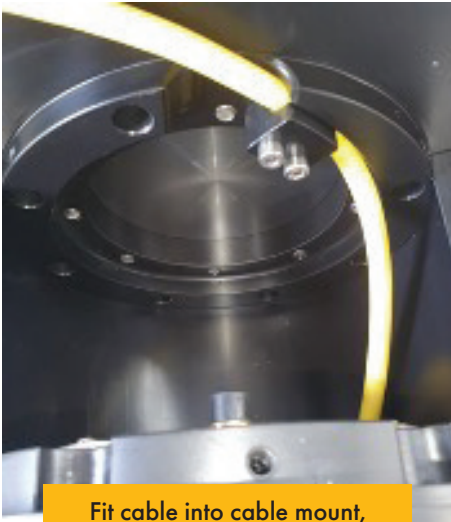


Set up drum with cable hole at top. Remove five M6 screws from access lid. Put one screw in centre of lid to pull lid from drum.

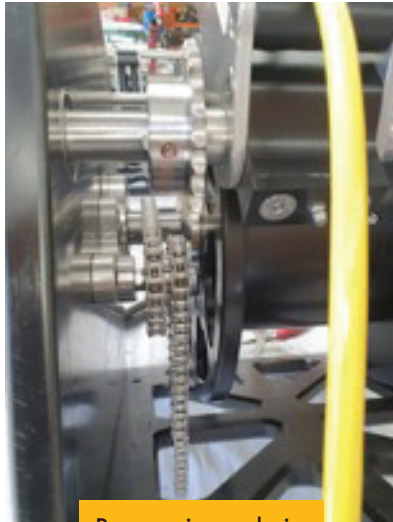


Operation Procedures

4.3 LEVEL WIND SETTING AT START OF CABLE LAY. CABLE INSTALLATION



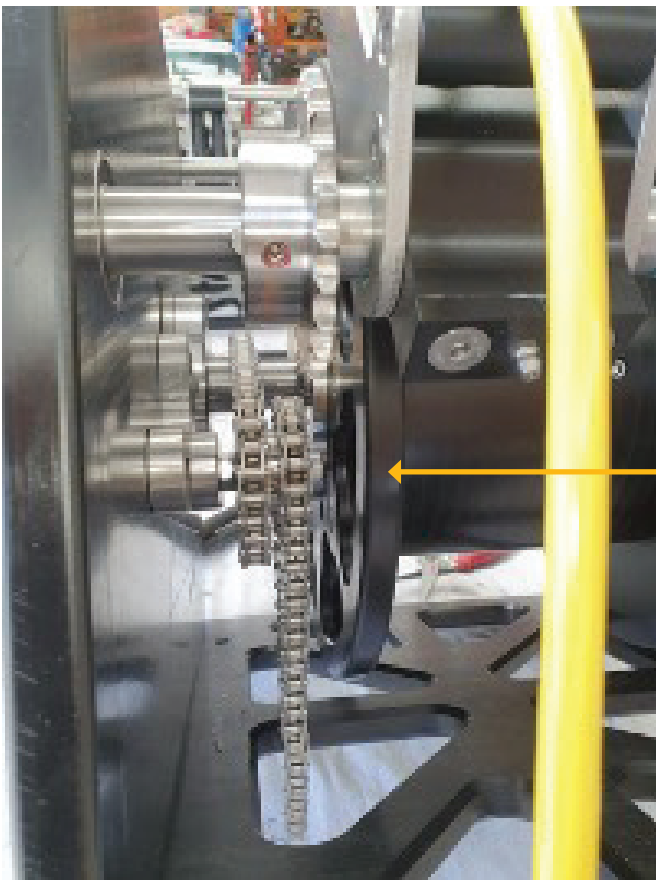
Fit cable into cable mount, connect to slip ring.



Remove inner chain.



Rotate one wrap onto drum, sit level onto drum to level out drum, fit drum access lid.



Rotate level wind sprocket until fairlead just stops travelling in this direction (towards gearbox).

Install inner chain.

Slowly rotate drum holding cable on drum as it rotates until at least 4 wraps are on drum. Keep tension on cable to ensure cable is tightly wrapped on drum.

Cable should be wrapped on drum under tension until full length of cable is installed.

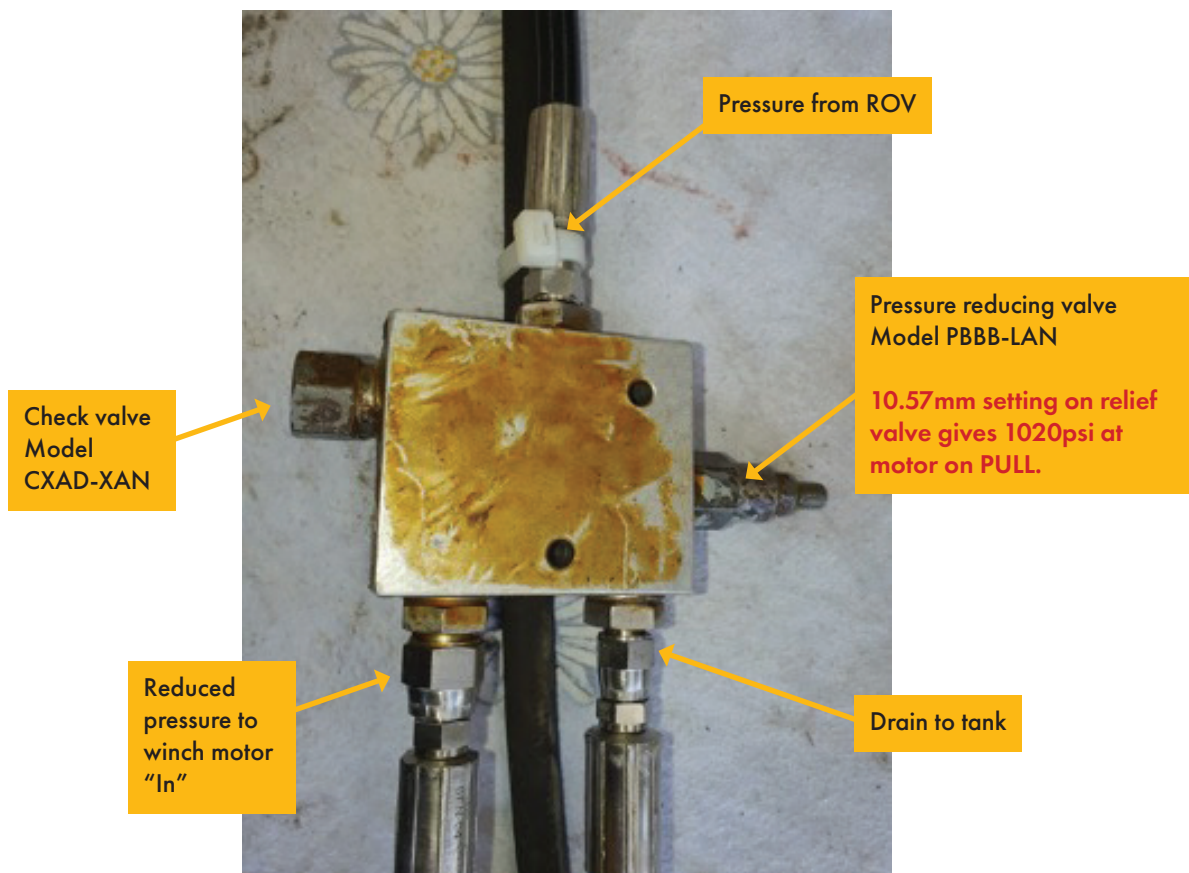
ALWAYS KEEP AT LEAST 6 WRAPS ON DRUM AT ALL TIMES.

Operation Procedures

4.4 HYDRAULIC CONNECTION

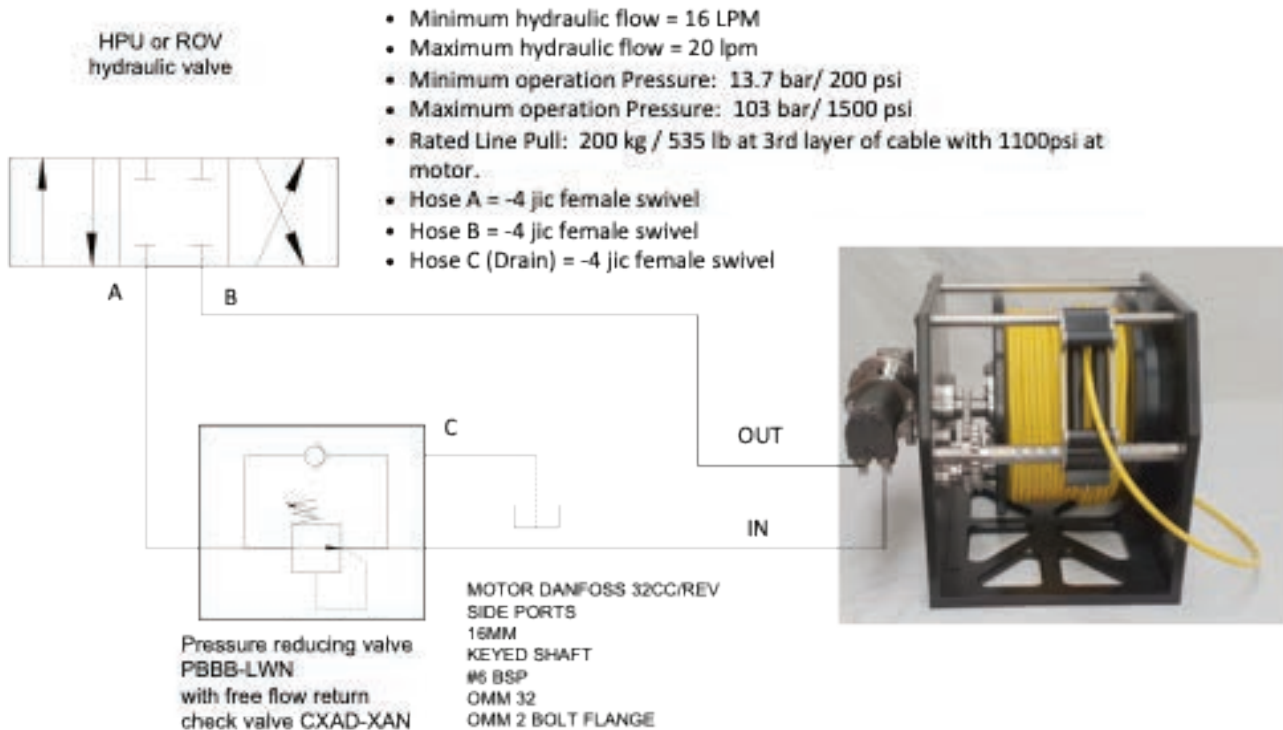


MOTOR DANFOSS 32CC/REV
SIDE PORTS
16MM
KEYED SHAFT
#6 BSP
OMM 32
OMM 2 BOLT FLANG



Operation Procedures

4.5 HYDRAULIC CONNECTION



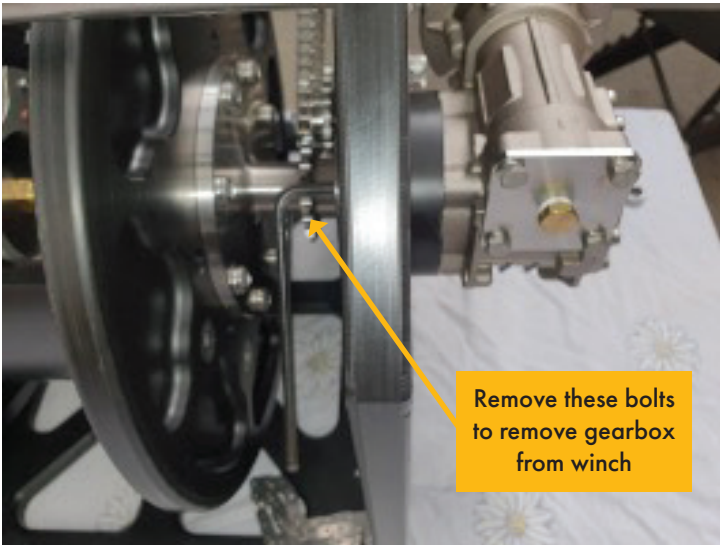
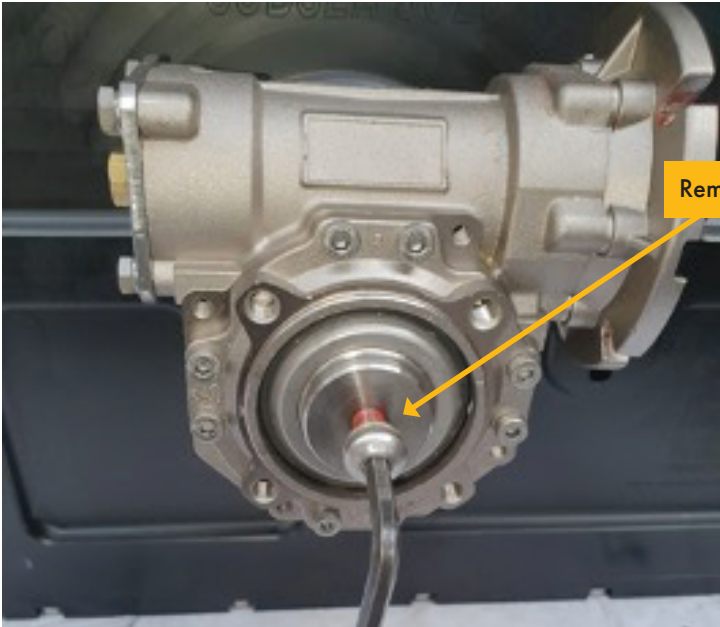
Hydraulic input to motor "IN" port vs winch pull on first layer:

- 350 psi = 70kg / 187 lb
- 550 psi = 100kg / 267 lb
- 750 psi = 130kg / 348 lb
- 900 psi = 150kg / 401 lb
- 1000 psi = 175 kg / 468 lb
- 1100 psi = 200kg / 535 lb

1 x 1.5mtr long , 206barWP hose =	1/4"BSPT at one end to screw into pressure reducing block.	-4 jic female swivel straight at other end (DRAIN to ROV tank) HOSE C
1 x 500 mm long , 206barWP hose =	1/4"BSPT at one end to screw into pressure reducing block.	-4 jic female swivel straight at other end (PULL IN / to ROV) HOSE A
1 x 2.5mtr long , 206barWP hose =	1/4"BSPT at one end to screw into pressure reducing block.	-4 jic female swivel 90 elbow at other end (PULL IN to motor)
1 x 3mtr long , 206barWP hose =	-4 jic female swivel straight at one end (SPOOL OUT / to ROV)	-4 jic female swivel 90 elbow at other end, (SPOOL OUT to motor) HOSE B

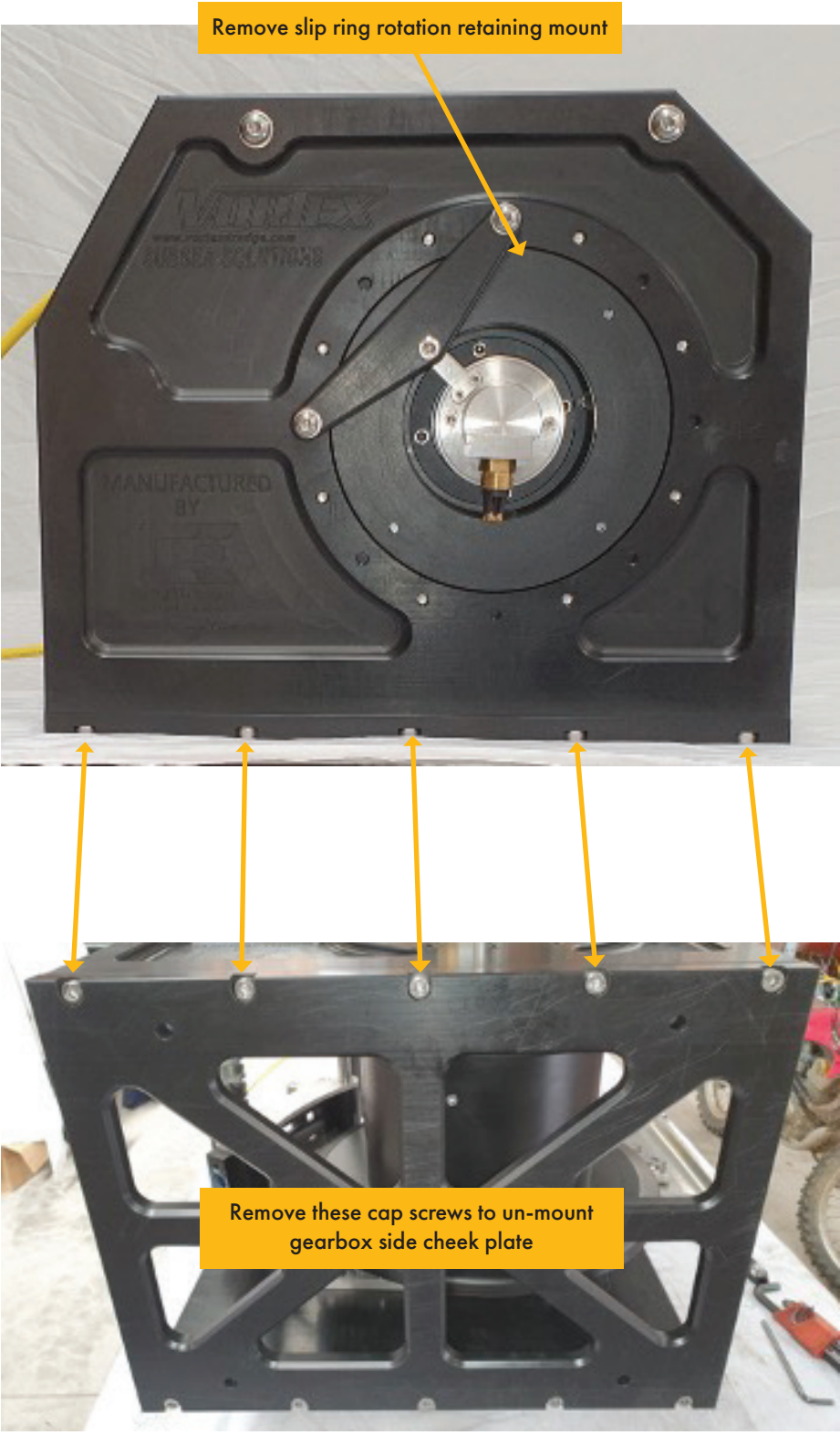
Operation Procedures

4.6 SERVICING: WINCH DISASSEMBLY



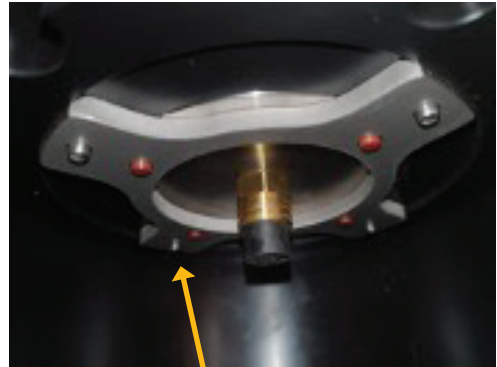
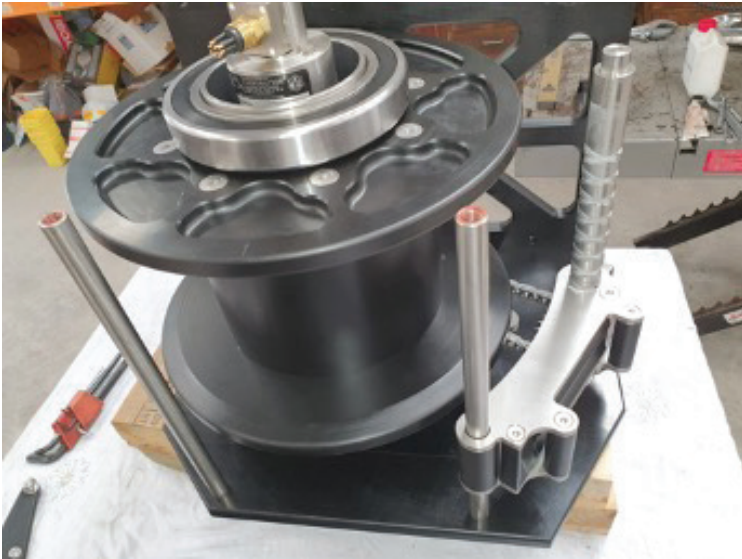
Operation Procedures

4.7 SERVICING: WINCH DISASSEMBLY



Operation Procedures

4.8 SERVICING: WINCH DISASSEMBLY

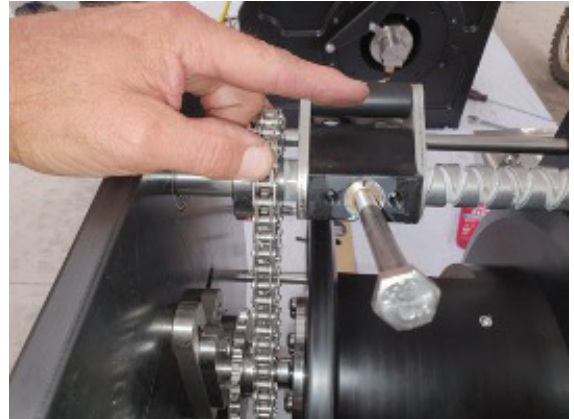


Remove slip rings with the fasteners shown. Slip rings can be changed with winch fully assembled.

Remove slip ring anti-rotation plate with the fasteners shown. Re fit fasteners with Loctite 243 upon reassembly.

Operation Procedures

4.9 SERVICING: WINCH DISASSEMBLY



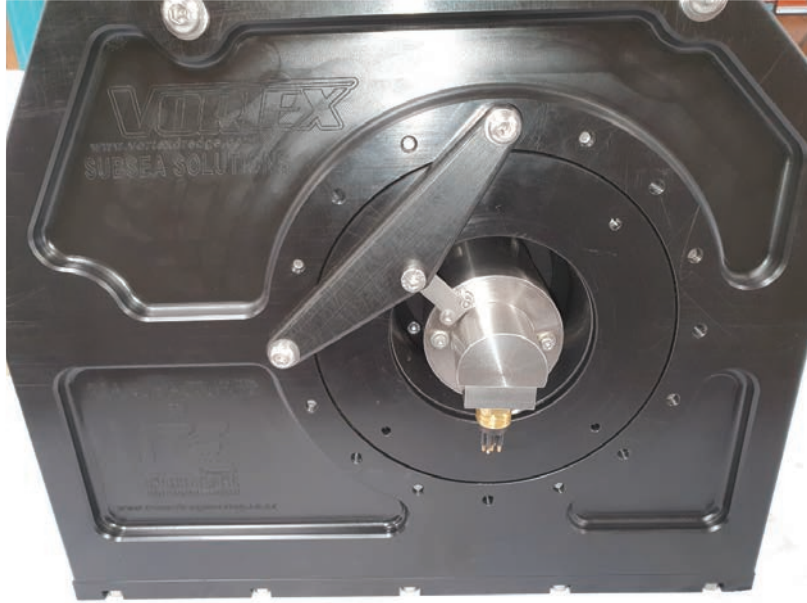
Remove chains and pawl. Level wind assembly will slide off the support shafts.

Remove fasteners shown to pull drum away from drive shaft

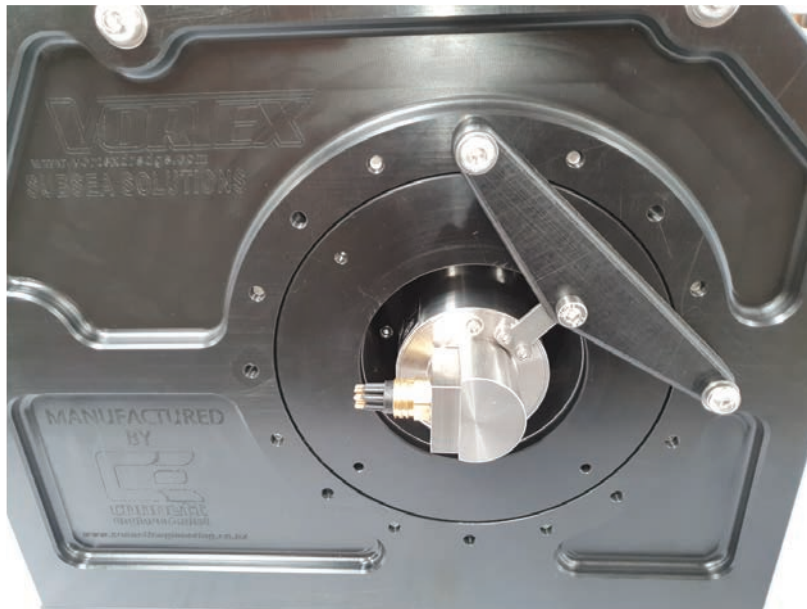


Operation Procedures

4.10 SERVICING: WINCH DISASSEMBLY



Slip ring connector orientation can be changed as shown.



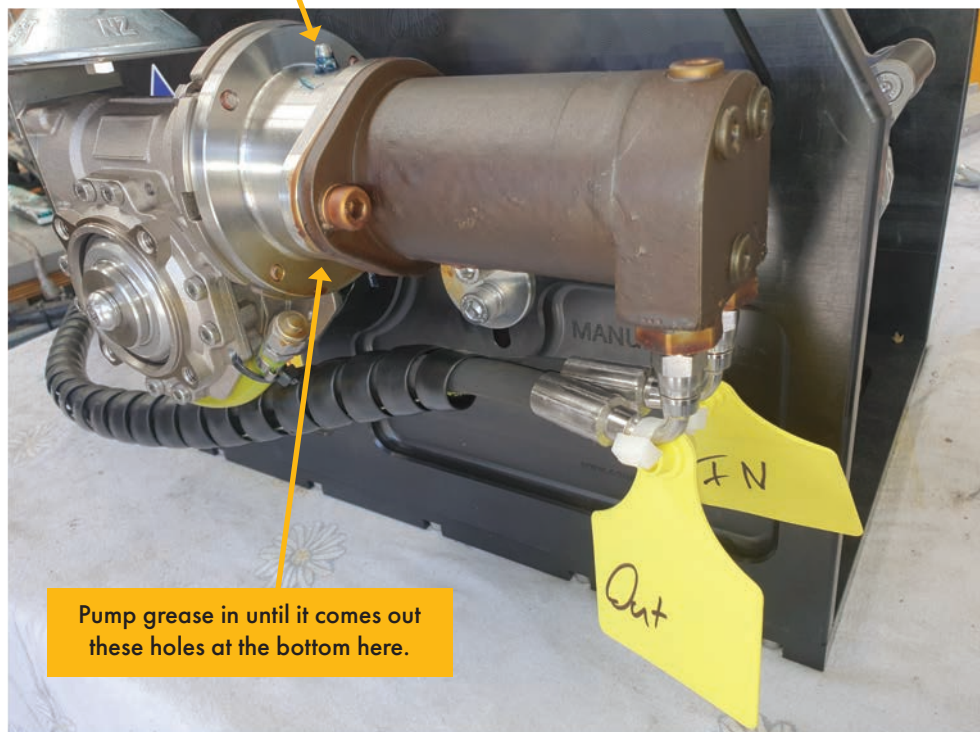
REASSEMBLY OF WINCH IS THE REVERSE OF DISASSEMBLY.

Operation Procedures

4.11 SERVICING: RUST PREVENTATIVE AND LUBRICATION

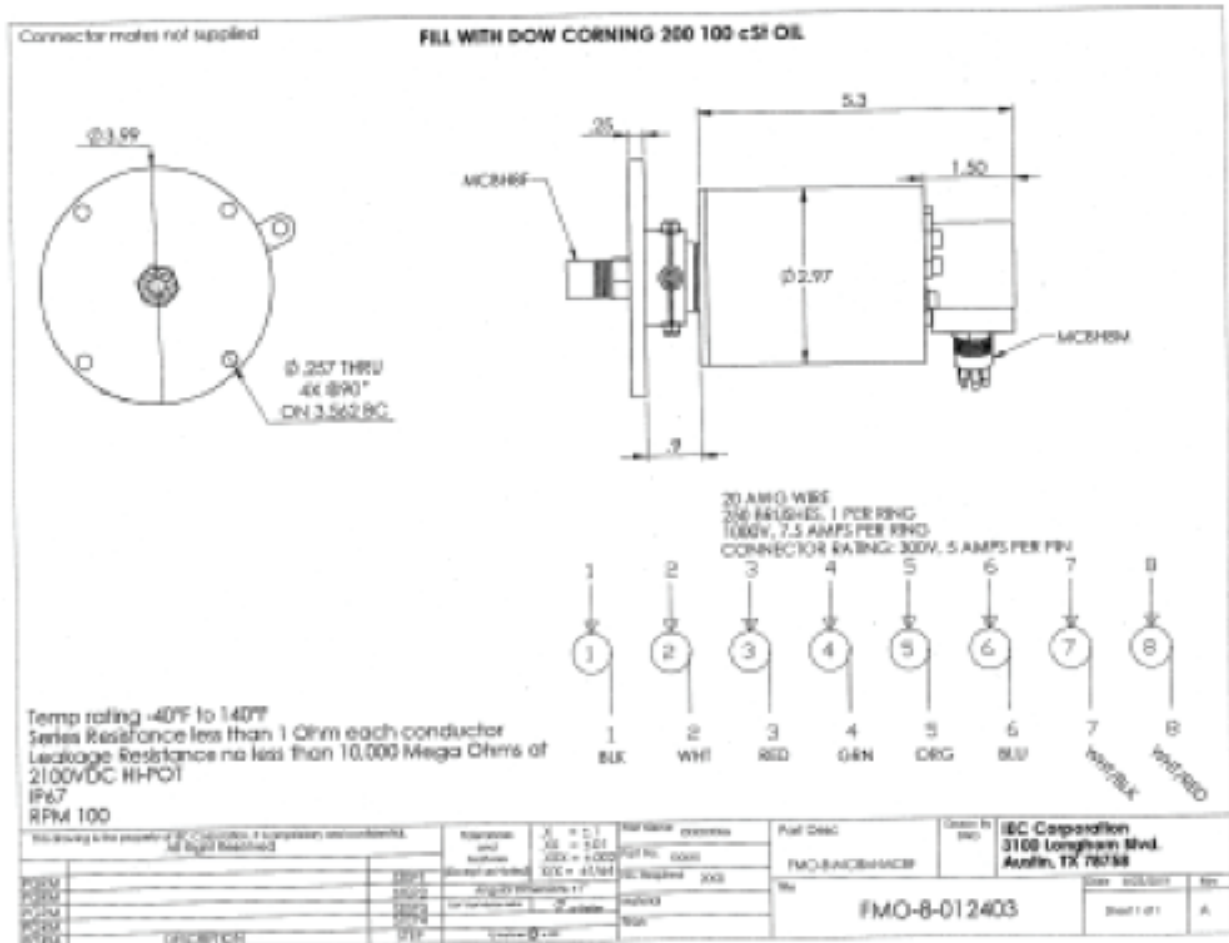
After 3 to 5 dives, remove hydraulic motor, wash out with fresh water any debris, dry thoroughly and liberally spray a lot of rust preventative such as shown to protect carbon steel parts of gearbox. Spray the same on all areas of motor before bolting on gearbox. Spray gearbox with same product to prevent corrosion.

Before and after each deployment, pump grease in top to fill voids with grease and push water out. This is to protect carbon steel parts of drive system.



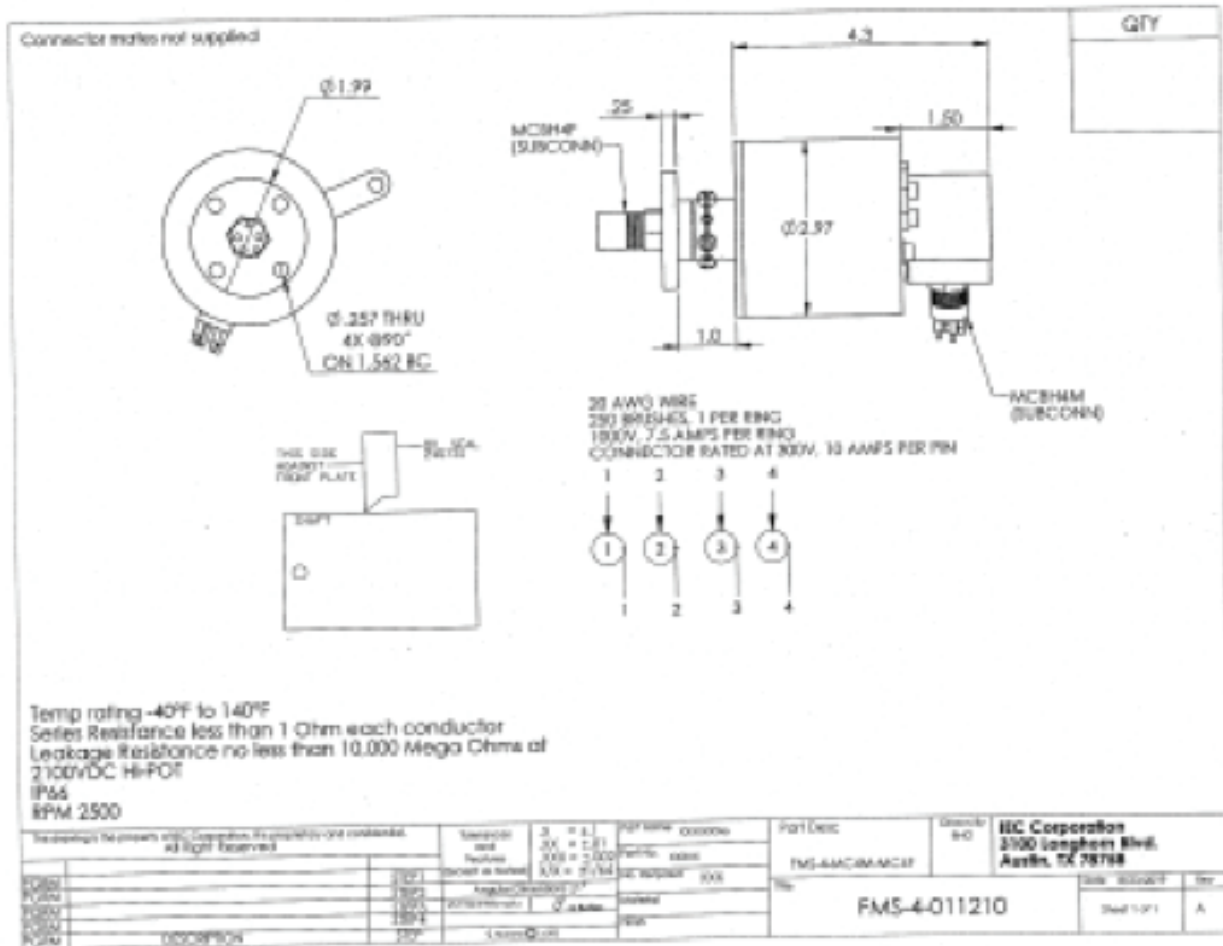
Operation Procedures

4.12 SLIP RINGS: PIN OUTS ON 8 WAY



Operation Procedures

4.13 SLIP RINGS: PIN OUTS ON 4 WAY



Maintenance, Storage & Inventory

Standard Procedures

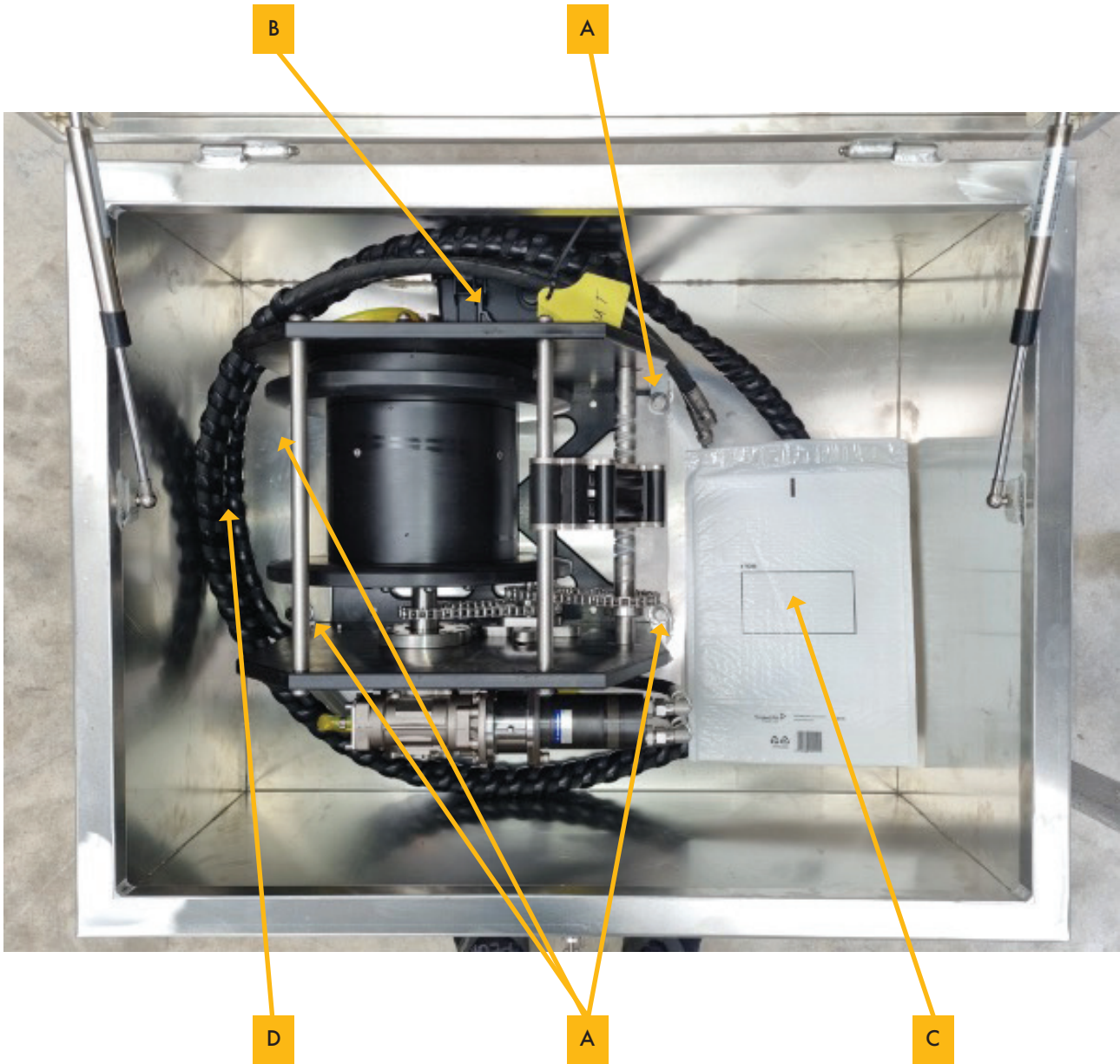
- Tool should be flushed with hot soapy water after each dive.
- Allow to dry fully.
- Spray rust preventative over aluminum and carbon steel parts.
- Check and replace anodes as required.
- Grease all points until full.
- Check operational condition of slip rings.
- Visual check of tool for anything which could prohibit future operation of the tool.

Replacement Procedures

- Contact Ashtead Technology representatives with reports of any damaged or unserviceable items

Shipping Box Storage

Wash winch and hoses with fresh water, dry and place in box as shown below.
Tighten four bolts on hold down plates prior to shipping.



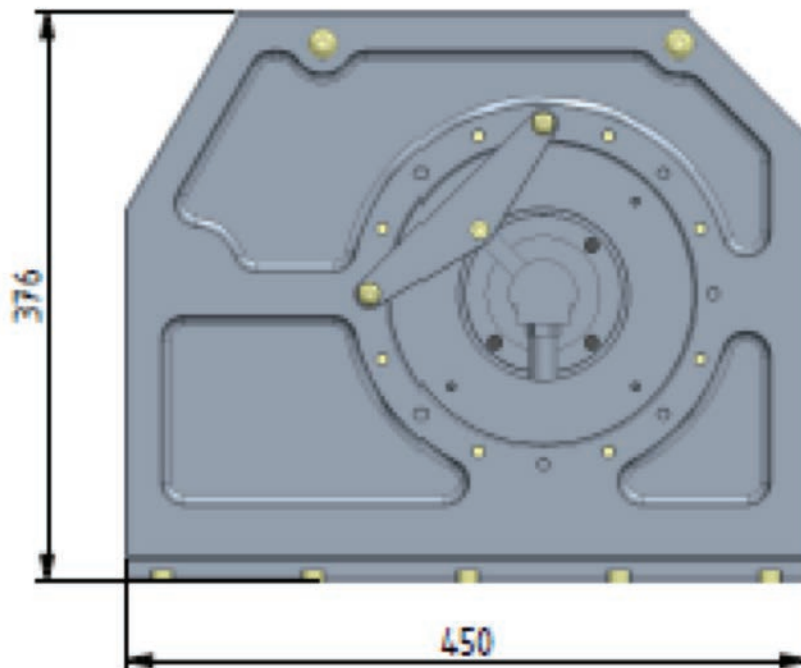
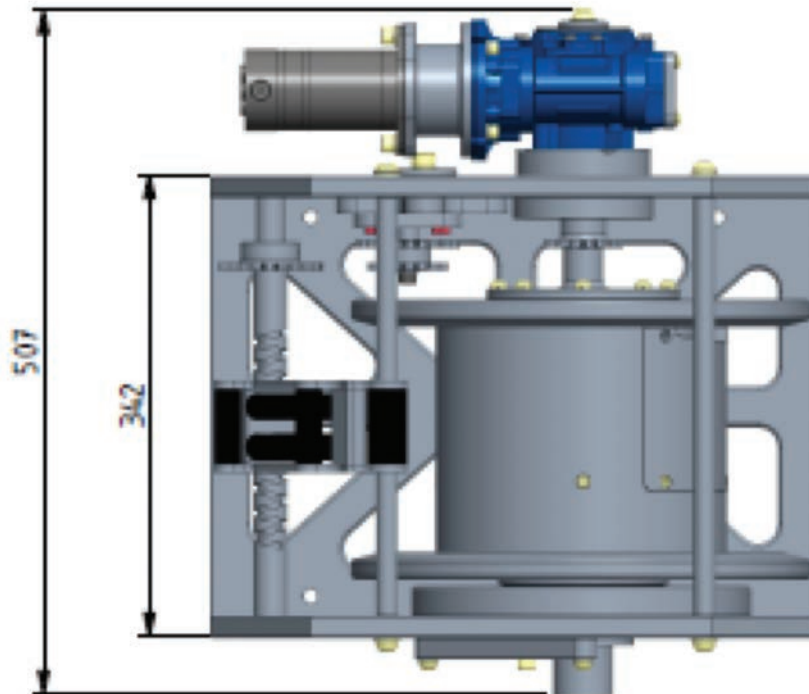
Shipping Box:

Width = 700mm
Height = 500mm
Length = 900mm
Weight = 71kg

- A Hold down bolt and plate
- B Spares box
- C Manual
- D Hydraulic hoses and integral hydraulic control

Appendix & References

6.1 TOOL DIMENSIONS AND WEIGHTS



- Weight in air: 38kg
- Weight in fresh water: 23kg

Appendix & References

APPENDIX 1

Gearbox oil: **OMALA S4 WE 320** or **SHELL TIVELA S 320**

www.mil-specproducts.com/products/SHELL-TIVELA-S-320

APPENDIX 2

Rust preventative spray

www.valvoline.com/en-nz/our-products/sds

APPENDIX 3

Slipping oil Dow Corning 200 100 CST Oil.

www.dow.com/en-us/document-viewer.html?randomVar=3004468110163817921&docPath=/content/dam/dcc/documents/en-us/productdatasheet/95/95-5/95-516-xiameter-pmx-200-si-fluid.pdf

Safety Data Sheet

Hazardous, Dangerous Goods



1. MATERIAL AND SUPPLY COMPANY IDENTIFICATION

Product name: **Tectyl 508 - Aerosol**

Synonyms: Tectyl 508 - Aerosol

Product Code: 8174

Recommended use: Corrosion Inhibitor

Supplier:	Valvoline (Australia) Pty Ltd	Valvoline New Zealand Limited
ABN:	36 000 440 825	511039
Street Address:	Level 6, 2 Durbank Place Saulkham Hills, NSW 2153 Australia	4 Starway Place Epslie Auckland New Zealand
Telephone:	+61 2 9036 7999	64 920 4305
Facsimile:	+61 2 9034 5177	64 920 4304

For emergency product information contact Valvoline Technical Hotline for Australia - 1800 894 898 or New Zealand - 0801 2 860 290. Hours of operations are Monday to Friday, 8:30 am - 4:30 pm Australian EST.

2. HAZARD IDENTIFICATION

This material is hazardous according to health criteria of Safe Work Australia.

Signal Word:
Danger

Hazard Classifications:
Flammable Aerosol - Category 1
Aspiration Hazard - Category 1
Skin Corrosion/Irritant - Category 2
Specific Target Organ Toxicity (Single Exposure) - Category 3 Nervous Effects

Hazard Statements:
H222 Extremely flammable aerosol.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H336 May cause drowsiness or dizziness.

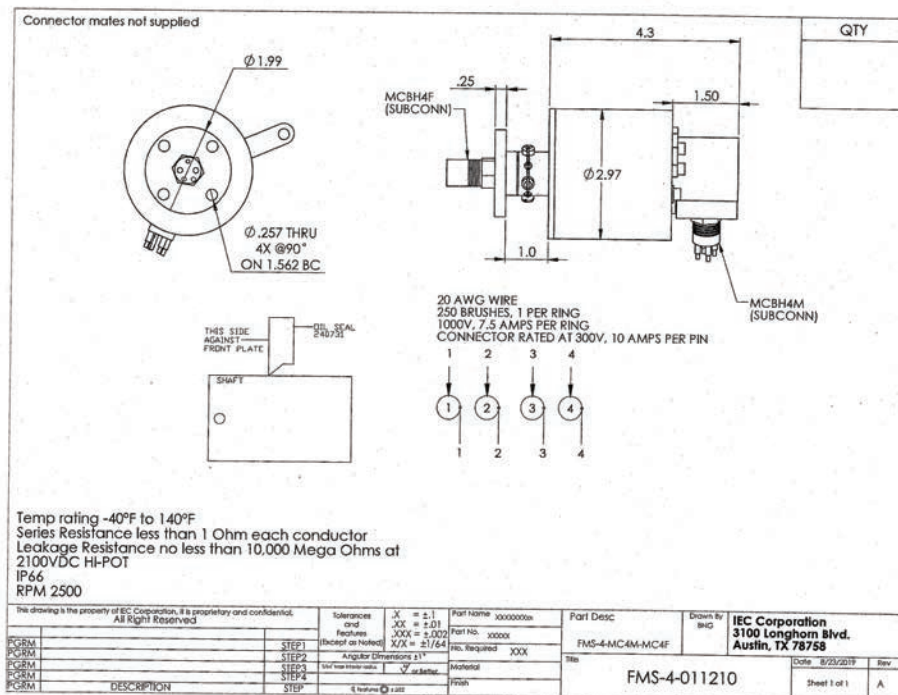
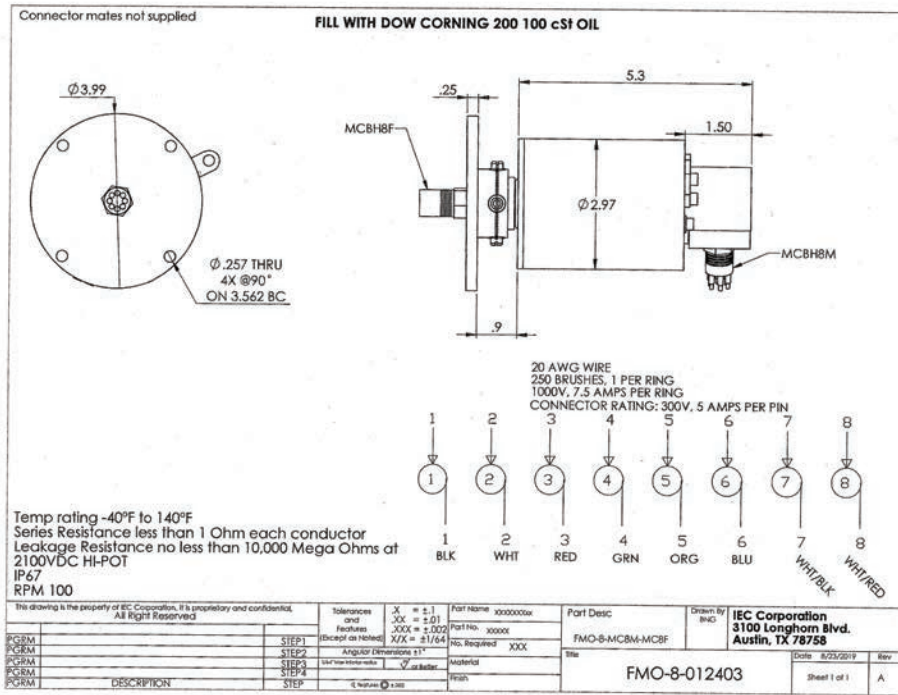
Prevention/Precautionary Statements:
P102 Keep out of reach of children.
P103 Read label before use.
P110 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P211 Do not spray on an open flame or other ignition source.
P231 Do not breathe or burn, even after use.

Product Name: Tectyl 508 - Aerosol Reference No: VAL 90301
Issued: 2020-05-21 Version: 1.0 Page 1 of 8

Appendix & References

APPENDIX 4

Slip rings: IEC Corporation FMO-4-MC4M-MC4F and FMO-8-MC8M-MC8F stainless steel housing, Industrial quality version, Oil filled with Dow Corning 200 100 CST Oil. www.ieccorporation.com/flange-mount



Appendix & References

APPENDIX 4

Slip ring maintenance



3100 Longhorn Blvd.
Austin, Texas 78758-7696 USA
info@ieccorporation.com

Phone (512) 836-0547
Fax (512) 834-1082

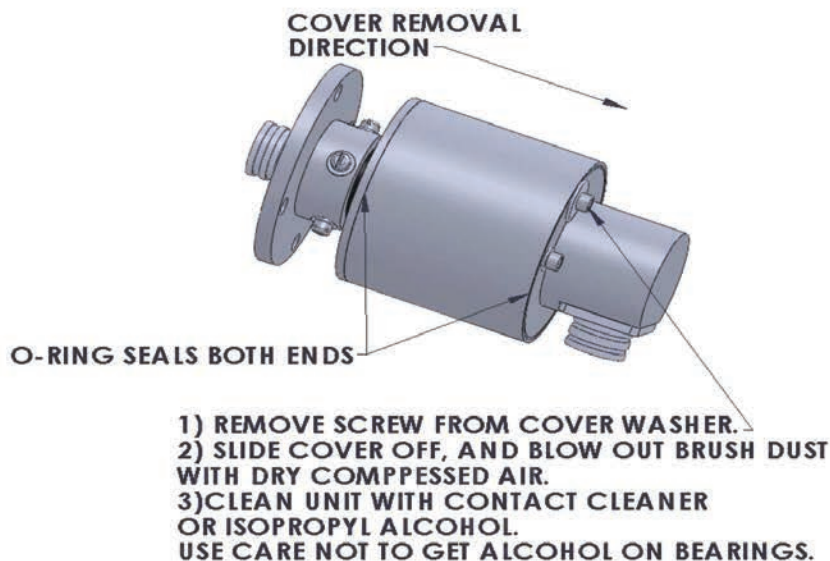
IEC Slip Ring Recommended Maintenance:

Routine cleaning is recommended after every 500,000 slip ring revolutions; the primary purpose is to remove accumulated brush dust to prevent arc-over.

Standard Flange Mount Slip Ring

1. Remove cover:
 - a. Remove the screw from cover washer ONLY.
 - b. Slide cover towards the non-rotating end to remove.
2. Clean:
 - a. Using dry compressed air, clean the brush dust off the major components.
 - b. Using a cotton swab dampened with isopropyl alcohol, clean the surface of the rings. Use care to avoid getting the alcohol in the bearings.
3. Reassemble:
 - a. Replace the cover and refasten the cover washer screw.

****Figure 1**



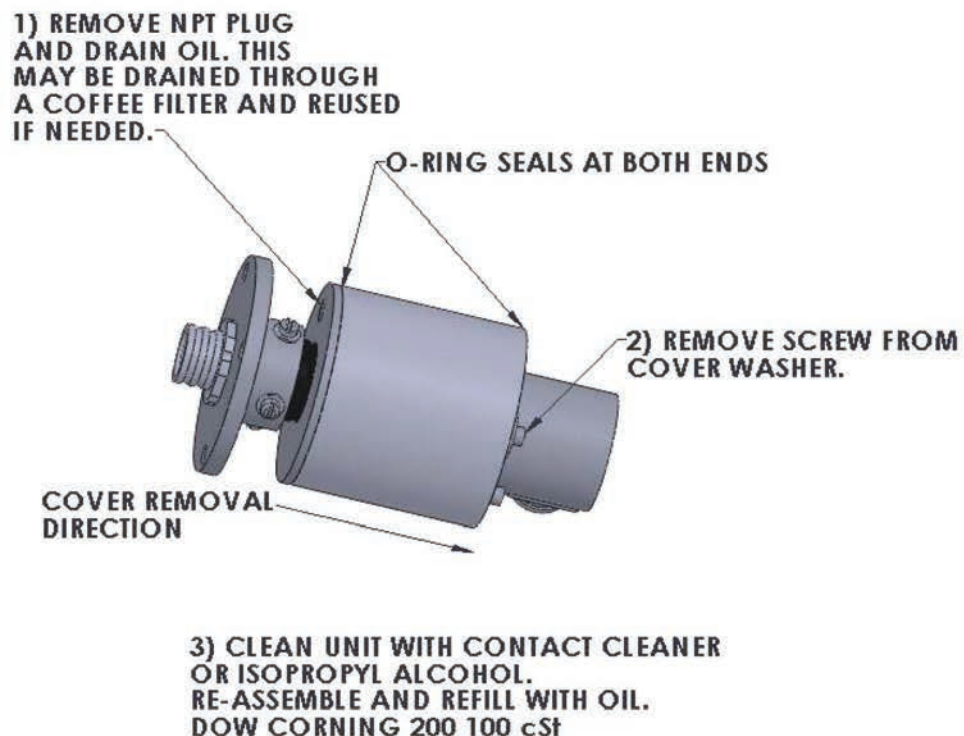
Appendix & References

APPENDIX 4

Slip ring maintenance

Standard Flange Mount with Synthetic Oil Slip Ring

1. Drain oil:
 - a. Using the NPT plug located on the face of slip ring closest to the rotating flange, drain the oil from the unit. (This may be drained through a coffee filter and reused if needed).
2. Remove cover:
 - a. Remove the screw from cover washer ONLY.
 - b. Slide cover towards the non-rotating end to remove.
3. Clean:
 - a. Rinse the remaining brush dust from the slip ring with clean oil (Dow Corning 200-100 CST), or spot clean with contact cleaner/isopropyl alcohol.
4. Reassemble:
 - a. Replace the cover and refasten the cover washer screw.
5. Refill with oil (Dow Corning 200-100-CST).



****Figure 2**

**The Figures above depict a few generic slip rings. Slip rings with different connectors/leads may require slightly different steps to disassemble, in particular to remove the cover.

Appendix & References

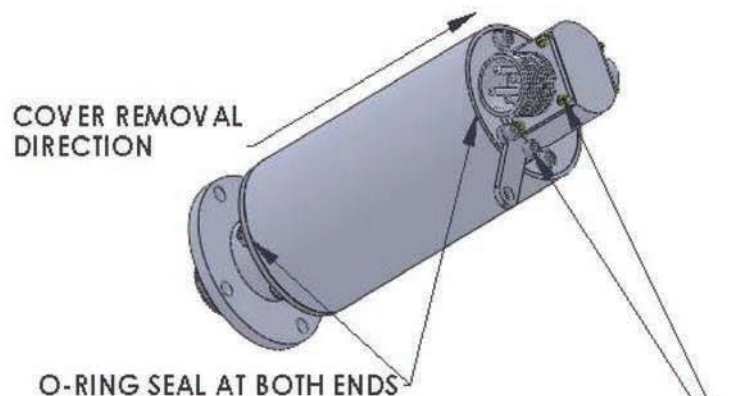
APPENDIX 4

Slip ring maintenance

FMSE Slip Ring

This is a 2000VDC rated unit. Cleaning intervals should be performed at ~1 million revolutions.

1. Remove cover:
 - a. Remove the two screws from the anti-rotation tab and the four screws from the connector ONLY.
 - b. Slide cover towards the non-rotating end to remove.
2. Clean:
 - a. Using dry compressed air, clean the brush dust off the major components.
 - b. Using a cotton swab dampened with isopropyl alcohol, clean the surface of the rings. Use care to avoid getting the alcohol in the bearings.
3. Reassemble:
 - a. Replace the cover and refasten anti-rotation tab screws.



- 1) REMOVE THE TWO SCREWS ON THE ANTI ROTATION TAB AND REMOVE THE 4 SCREWS ON THE CONNECTOR.
- 2) MOVE CONNECTOR AWAY FROM COVER, THEN SLIDE COVER OFF.
- 3) BLOW OUT BRUSH DUST WITH DRY COMPRESSED AIR. CLEAN RINGS WITH ISOPROPYL ALCOHOL ON A COTTON SWAB. USE CARE NOT TO GET ALCOHOL ON BEARINGS.

Hipot and Leakage Resistance

Any standard unit rated at 1000VRMS is tested at 2100VDC between each ring and all other rings and each ring to the case. Leakage Resistance 10000MegaOhm min.

Series Resistance

Typical resistance of a standard IEC slip ring with connectors at both ends, and wired with 20AWG wire, is 8 milliohms pin to pin.

Resistance will vary with each slip ring configuration.

Appendix & References

APPENDIX 4

Sprockets and drive chains

Sprockets: 1/2" BS SIMPLEX S

Chain: 08B-1-SS-KANA BS 1/2" SIMPLEX
S/S CHAIN

Chain link: 08B-1-SS-CL-KANA BS 1/2"
SIMPLEX S/S CONN L

Drum to idler chain: 505 mm

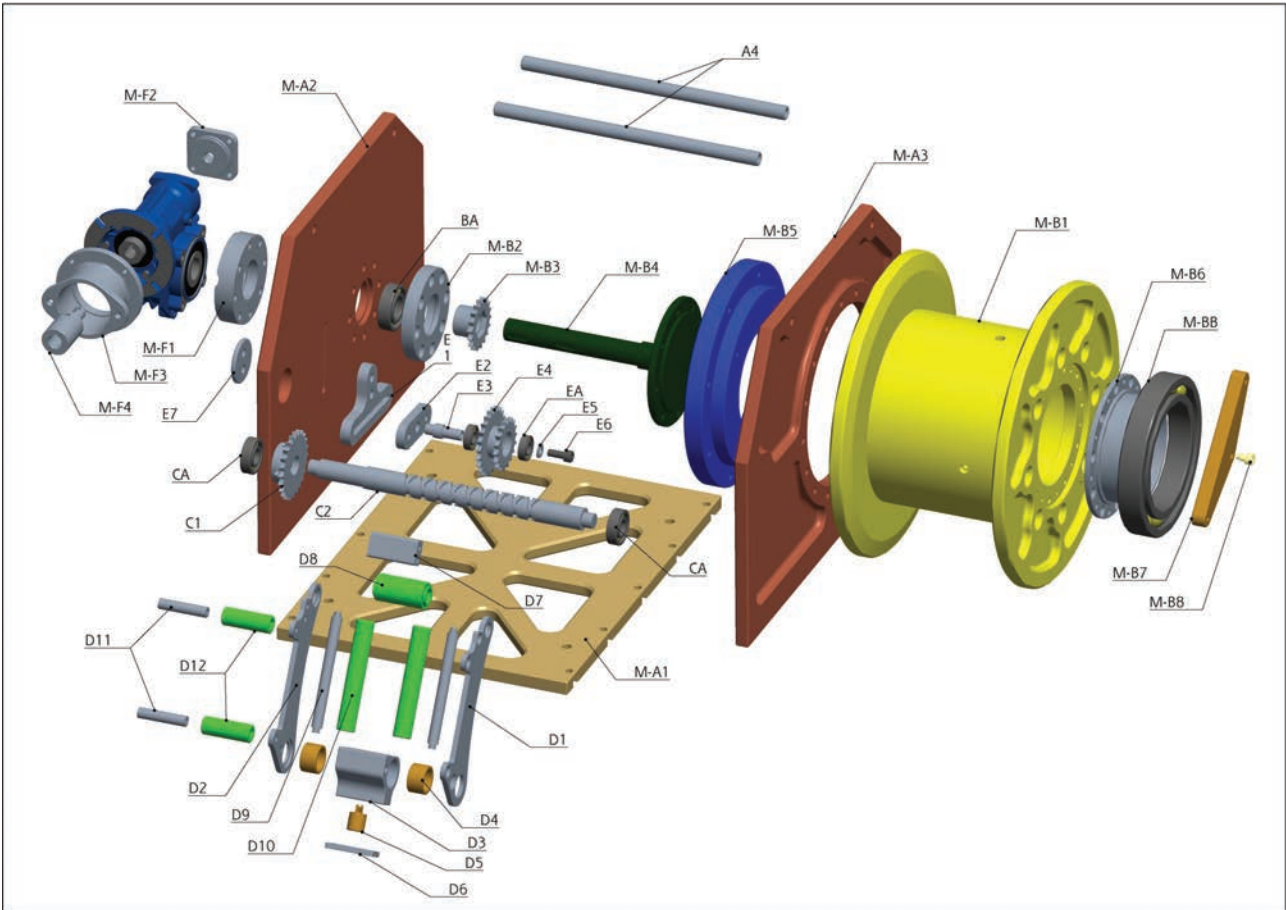
Idler to level wind chain: 445 mm



Appendix & References

APPENDIX 4

Winch exploded view



Appendix & References

APPENDIX 5

Parts Guide



MEDIUM DUTY WINCH - PARTS GUIDE

Part No.	ITEM - HOUSING	Qty	Material
M-A1	BASE PLATE	1	Acetal
M-A2	SIDE PLATE - DRIVE	1	Acetal
M-A3	SIDE PLATE - NON DRIVE	1	Acetal
A4	TIE RODS	2	Stainless Steel

Part No.	ITEM - DRUM LINE	Qty	Material
M-B1	DRUM - 5 PIECE	1	Acetal
M-B2	BEARING HOUSING A	1	Stainless Steel
M-B3	18 TOOTH - DRIVE GEAR	1	Stainless Steel
M-B4	DRIVE SHAFT	1	Stainless Steel
M-B5	BEARING HOUSING B	1	Acetal
M-B6	NON DRIVE SHAFT	1	Stainless Steel
M-B7	SLIP RING ANTI-ROTATION PLATE	1	Acetal
M-B8	M8x12 SHCS SPECIAL	1	Stainless Steel
BA	BEARING - 6205	1	Stainless Steel
M-BB	BEARING - 6024	1	Stainless Steel

Part No.	ITEM - LEAD SCREW	Qty	Material
C1	24 TOOTH DRIVE GEAR	1	Stainless Steel
C2	LEAD SCREW	1	Stainless Steel
CA	BEARING - 6203	2	Stainless Steel

Appendix & References

APPENDIX 5

Parts Guide

Part No.	ITEM - LEVEL WIND	Qty	Material
D1	SIDE PLATE A	1	Stainless Steel
D2	SIDE PLATE B	1	Stainless Steel
D3	BOTTOM HUB	1	Acetal
D4	BOTTOM HUB BUSH	2	Bronze
D5	PAWL	1	Bronze
D6	COVER PLATE	1	Stainless Steel
D7	SUPPORT BLOCK	1	Acetal
D8	GUIDE BUSH	1	Acetal
D9	VERTICAL ROLLER SHAFT	2	Stainless Steel
D10	VERTICAL ROLLER	2	Acetal
D11	HORIZONTAL ROLLER SHAFT	2	Stainless Steel
D12	HORIZONTAL ROLLER	2	Acetal

Part No.	ITEM - TENSIONER	Qty	Material
E1	FIXED BRACKET	1	Stainless Steel
E2	SLIDE BRACKET	1	Stainless Steel
E3	SHAFT	1	Stainless Steel
E4	18/24 TOOTH IDLER GEAR	1	Stainless Steel
E5	BEARING RETAINER	1	Stainless Steel
E6	M8x20 CAP SCREW	1	Stainless Steel
E7	CLAMP WASHER	1	Stainless Steel
EA	BEARING - 6001	2	Stainless Steel

Appendix & References

APPENDIX 5

Parts Guide

Part No.	ITEM - AUXILIARY	Qty	Material
M-F1	GEARBOX SPACER	1	Acetal
M-F2	GEARBOX PRESSURE CAP	1	Stainless Steel
M-F3	MOTOR SPACER	1	Stainless Steel
M-F4	MOTOR SPACER DRIVE	1	Stainless Steel

Part No.	ITEM - CHAIN	Qty	Material
ZA	DRUM TO IDLER	1	Stainless Steel
ZB	IDLER TO LEVEL WIND	1	Stainless Steel

Appendix & References

APPENDIX 5

Spares



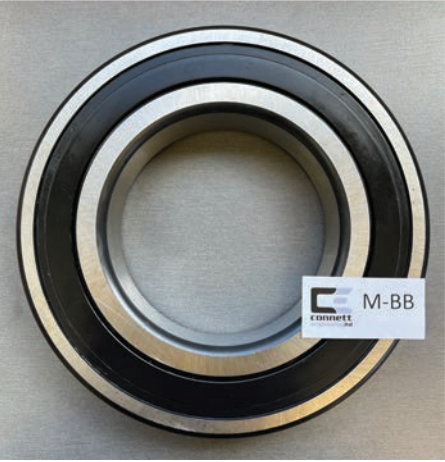
SPARES

Part No.	ITEM	Qty	Material
BA	BEARING - 6205	1	Stainless Steel
M-BB	BEARING - 6024	1	Stainless Steel
CA	BEARING - 6203	2	Stainless Steel
EA	BEARING - 6001	2	Stainless Steel
ZA	DRUM TO IDLER	1	Stainless Steel
ZB	IDLER TO LEVEL WIND	1	Stainless Steel

Appendix & References

APPENDIX 5

Spares



Contacts



JOE GOODIN

MANAGING DIRECTOR

VORTEX International Ltd

27 Parris Road, RD1, New Plymouth, New Zealand

Tel/Fax: +64 (6) 753 8102, Mobile: + 64 (0) 27 688 5372

Email: joe@vortextdredge.com

Website: vortextdredge.com



IN ASSOCIATION WITH ASHTEAD TECHNOLOGY:

ABERDEEN

Ashtead Technology Ltd

Ashtead House, Discovery Drive, Arnhall Business Park,
Westhill, Aberdeenshire AB32 6FG

Tel: +44 (0) 1224 771888,

Email: aberdeen@ashtead-technology.com

SINGAPORE

Ashtead Technology (S.E.A) Pte Ltd

Loyang Offshore Supply Base, 25 Loyang Crescent,
Block 302, Unit 02-12 TOPS Ave 3, PO Box 5157,
SINGAPORE 508988

Tel: +65 6545 9350,

Email: singapore@ashtead-technology.com

HOUSTON

Ashtead Technology Offshore Inc

19407 Park Row, Suite 170, Houston, TX 77084, U.S.A

Tel: +1 281 398 9533,

Email: houston@ashtead-technology.com

SCOPE ENGINEERING

(Ashtead Technology Agent)

Scope Engineering (WA) Pty Ltd

35 Stuart Drive, Henderson, Western Australia 6166

T: +61 8 6498 9642 F: +61 8 6498 9584,

Email: Perth@ashtead-technology.com

INNOVA AS

P.O. Box 390 Forus, 4067 Stavanger

Phone: +47 51 96 17 00

Fax: +47 51 96 17 01

Email: post@innova.no

TES SURVEY EQUIPMENT SERVICES LLC

PO Box 128256

Abu Dhabi, UAE

Tel: + 971 2 650 7710

Fax: +971 2 650 7200

Email: info@tesme.com



VORTEX
SUBSEA SOLUTIONS

vortexdredge.com