

# USER MANUAL FOR SUBSEA SAW 60-200 mm

**Document title** : *UMA-4856-010 Subsea Saw 60-200 mm*  
**IKM Subsea AS ref.** : IKM-1047718  
**Customer ref.** : *Subsea Tool*



## IKM Subsea AS


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04		General update + added repair work and maintenance	TO	TL	OG

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## 1 GENERAL INFORMATION

This manual is a user manual for the Ø60-200 Subsea Saw tool.

This Subsea Saw has a rotating blade which is 600 mm in diameter. It is built to be used with a Subsea ROV, controlled by manipulator and hydraulic supply from the ROV to drive the saw.

It is designed to cut steel pipes/profiles, armored cables and flexirisers. Standard blades to be supplied with the saw are usually carbide types. The saw has claws to hold on to the object which is being cut. Claws can be replaced if specific interface is required.


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## 1.1 Abbreviations

HPU	Hydraulic Power Unit
ROV	Remotely Operated Vehicle
kg	Kilo gram
mm	Milli meter
BSP	British standard pipe
JIC	Joint industry council
CCM	Cubic centimeter
LPM	Liter per minute
Nm	Newton meter
CCW	Counter clockwise
RPM	Rounds per minute


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## 1.2 References

<b>Doc nr</b>	<b>Description</b>	<b>Rev.</b>	<b>Issued</b>	<b>Can be found</b>
IKM-1047718	Drawing of Subsea Saw 60-200 mm	04	08.02.2024	Appendix A
	Hydraulic Schematic			Appendix B

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## 2 TECHNICAL SPECIFICATION

The Subsea Saw main components is steel frame, cutting blade, claws with hydraulic cylinders to hold on to object being cut, and a 305 ccm motor attached to a cylinder which regulates the cutting feed. Flow control valve IKM-1100260.

Hydraulic supply and control of the Subsea Saw is by means of and through the ROV system. Recommended cutting diameter is set to 60-200 mm.

Description General	Description Detailed		Value	Unit
Dimensions	Complete Arrangement	L x W x H	1455 x 716 x 423	mm
	Cutting diameter	Min / max	Ø60 / Ø200	mm
	Saw blade	Typical	Ø600	mm
Weight	Complete Arrangement	In air	89	kg
		In water	68	kg
Hydraulics	Pressure, flow and connections	Motor	180-200	Bar
			55-65	LPM
			BSP (JIC optional)	Inch
		Feed cylinder	Feeds of motor function	Bar
			Feeds of motor function	LPM
			NA	Inch
		Claw cylinders	150-207	Bar
			<15	LPM
BSP (JIC Optional)	Inch			

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### 3 SAFETY

#### 3.1 General – Operations

Only authorised people and qualified personnel should work on the system and take suitable precautions to prevent any potential injuries. Always adhere to authorised working practices and use the correct tools for the job. To facilitate this, make sure that these are available before commencing a test of the tool.

Ensure that the working area is kept clear and uncluttered.

#### WARNING!!



**The tool is fitted with a potentially very dangerous and extremely sharp saw blade with real cutting hazard also when not rotating.**

**Wear proper PPE for manual handling of the blades, and minimum 2 persons should handle the blade.**

**During hydraulic operation/testing of the tool; establish barriers around work area and never operate the blade rotation before personnel are confirmed to be in a safe distance from the tool.**

#### 3.2 General – Hydraulic


Do not work on pressurised systems. Hydraulic systems contain a large amount of stored energy when pressurised, therefore the system (including any accumulators) should be de-pressurised, and the power pack switched off, prior to working on the system. Exceptions to this would be system adjustments to components requiring the presence of pressure and/or flow.

Any personnel authorised to work on the system must have a complete understanding of the operation of the hydraulic system, so that they will be aware of any system liable to remain pressurised or hazardous in any other way. Ensure that all personnel are clear of any mechanical/hydraulic system likely to move if pressure to system actuators is released or applied.

Do not attempt to tighten any leaking fittings whilst under pressure. A hose/fitting rupture could result, leading to injury from flying components and/or oil jets.

Regularly inspect hoses, fittings, and pipework for mechanical damage. If any such damage is found, the item must be repaired or replaced as necessary before pressure is applied to the system. Do not allow damaged fittings to remain in service.

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Take care when inspecting, commissioning, repairing, or maintaining the system to avoid jets of oil issuing from open orifices; pipe ends etc. if pressure is applied, Particular care should be taken to protect the eyes.

Hydraulic components may be heavy and slippery when covered in oil. Ensure that adequate protective clothing and footwear is used.

Any moving component should be treated with caution when the system is pressurised during operation, and especially during on-deck testing and repair. Keep clear of all moving components and take all necessary precautions to avoid injury when working on these systems by preventing movement of any components likely to cause injury.

### **3.3 General – Mechanical**

Beware of and keep clear of all moving components. Do not work on the system whilst power is applied, or if there is any potential for components to move.

Ensure that all load bearing components are adequately and regularly inspected. If damage is found the component must be repaired/replaced as necessary. Do not allow damaged components to remain in service.

Always ensure that items are correctly and adequately supported before removal, and that authorised lifting equipment and procedures are used.

Note: trying to lift heavy components in an awkward position by hand without the assistance of correct lifting equipment, or lifting any component without adopting the correct stance, can lead to serious injury.


Ensure that when working within or underneath the machine that your presence is known to your supervisor. If working underneath the machine, always ensure that there are no loose or unsupported assemblies, components, or tools above.

### **3.4 Subsea Saw**

The Subsea Saw is a rotating cutting tool and damage to health, life and property can occur if rules are not properly followed. The Subsea Saw should be secured in a vice or similar prior to connection to hydraulic power. The worksite is to be secured prior to adding power to the unit. In case of testing with ROV, secure are prior to power up ROV.



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## 4 OPERATIONAL DESCRIPTION

The following description is a generic description of preparation and use of the Subsea Saw. Customers are advised to adapt the following information to their own specific operations and specific work area.

### 4.1 Transportation

Make sure that the saw, sawblades and/or any other equipment is properly strapped in the transport box.

### 4.2 Preparation on the vessel prior to operations

- Unpack all parts and check for transport damages.
- Verify that all parts on equipment list is present.
- Check the cutting blade for damage.
- Check that the blade is installed correctly, not loose and correct direction.
- Check all hoses and fittings for damage and leaks. Bleed air as required.
- Check that all bolts are in place and tight.
- Connect the hydraulic hoses to the ROV corresponding hydraulic system.
- Ensure that the piston on the feed cylinder is fully retracted. (Operate motor CCW)

#### Function test:

- Do not start the saw on deck without securing the area.
- Run the clamp cylinders to full stroke.
- Time the motor feed rate.
- If the motor feed rate is to fast/slow, adjust it using the feed flow regulator and try again.  
(This is also dependent on the ROV flow and pressure).
- It is highly recommended that function test is performed without sawblade.

#### NOTE:

Always make sure that clean oil is used during test and operations!  
Impurities or contaminated oil can cause the saw to malfunction.

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### 4.3 Feed flow regulator

Locking nut :  
Adjustment feed speed:



- The regulator is located on the right-hand side, it can be seen in the drawing in Appendix A sheet 2 (item 19 on part list).
- The regulator can be adjusted to change the feed rate.
- Start by loosening the locking nut CCW while holding the adjustment flow adj. screw from turning.
- Adjust the flow adj screw in small increments.
- Apply adequate lubrication to adj. screw and locking nut as required. Recommended lubrication: Aqua lube/aqua shield.
- When desired feed rate is confirmed; tighten the locking wheel.

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#### 4.4 Subsea use

- Ensure all the checks and preparations have been performed.
- Ensure the saw is securely fastened to the ROV using the designated ROV handles.
- Alternatively, the saw can be operated via Hot Stab system and deployed to working depth by means of a subsea basket or by user of crane.
- If deployed in basket; ensure tool weight/loads are carried by tree trunks or similar against tool framework, and NOT resting against saw blade/hydraulic motor shaft/hub. Secure tool for deployment through splash zone. (Heavy duty strips, ropes or similar).
- Engage the saw into cutting position.
- Activate the clamp cylinders to lock the Subsea Saw to the object to be cut, (ensure it is securely fastened). Always leave clamp-close function activated during cutting.
- Release manipulator hold/grip on the saw and confirm that saw is secured to the cutting object by the claws. (Do NOT perform cutting with tool secured in manipulator grip).
- Start spinning the saw blade at full speed. Operating the rotation of the blade will also cause the feed cylinder to activate.
- Perform the cut.
- When the cut is finished - retract the saw blade by operating hydraulic motor in reverse direction.
- Secure Subsea Saw in ROV manipulator. Ensure safe grip before releasing clamp function.
- Open the clamp cylinders.
- Return to deck and perform "After operations maintenance", ref chapter 6.

#### NOTE!

Observe the saw closely during cutting. Pay particular attention to excessive movements and/or vibrations, and blade rotation speed. Excessive movements/vibrations or substantial decreasing rotation speed can indicate too high setting of the feed rate. Reduced rotation speed can also be caused by restriction/limitations in the hydraulic supply. (Confirm/verify ROV check valves and stab systems if they are in use – ensure that minimum recommended flow for the motor is supplied).

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## 5 BEST PRACTICE AND TROUBLE SHOOTING


### 5.1 General Operations and Hazards

- Always wear appropriate PPE, and in particular protective gloves to avoid cut injuries.
- Always seek to do maintenance and function testing on deck without the sawblade mounted on the tool. This is to minimize the risk of personnel touching the blades and get cut injury.
- Use only Orange painted handles as lifting points for the tool.
- Do not let the Subsea Saw rest it's weight against the blade-hub/motor-shaft during deck maintenance/blade change etc.
- Always verify that saw blade is mounted correctly on the saw regarding direction of rotation.
- Please do clean the tool with fresh water after use. Spray with WD40 or equivalent after cleaning.

### 5.2 If experiencing/expecting pinching forces

- Paint a stripe across the saw blade to easily observe RPM of the blade.
- Observe the rotation speed of the blade during cutting. Reduction of RPM during cutting is normal. However, if RPM is getting really low and it appears as if the blade rotation is about to stop; Immediately stop the cutting and retract blade before it gets jammed/stuck in the cut object.
- Alternative cut locations/positions may be tested out.
- Additional air bags/lift may be installed on the cut object. Or an object may be put under the cut-object to rest on - this is to make the cut-object "open up" as the cut progresses.
- You can also install washer(s)/"spacer" between the blade hub and the saw-blade. This will make the blade rotate with a "wobble", and the tool will cut a wider track in the cut object. This is a method often used when cutting larges size chains when material-stress forces are present. (There is a bag of washers for this purpose in the spares-kit).
- **Specific for cutting large chain links:** If cutting larger chain-link one side at the time, there sometimes may be substantial material-stress forces present. If this is the case, it is typically getting very difficult to complete the last 10% of cutting the first side of the link. (Closely observe blade RPM). If there are evidence of this being a problem; stop before completing first side of the link and re-locate the saw to the opposite side and start a new cut there. In extreme cases, you may have to change side for cutting several times.

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### 5.3 Trouble shooting/"Easy fix"

We hardly see any cases where the tool is not working as it should, but the feed function may be sensitive for impurities in the hydraulic oil.

- The saw feed function system is using a flow regulator set to a very low flow. This means this regulator is sensitive to even small impurities in the hydraulic oil. Should you experience that the feed-function appears to be working – but at the same time the feed-rate slows significantly down as the sawblade is being fed into the cut object, (very low feed-rate during cutting) - please perform the following steps to “flush” the flow regulator;
  1. Mark the set-point of the flow regulator for feed.
  2. Unlock the flow regulator for adjustment and open it fully counterclockwise for max flow.
  3. Cycle the subsea saw for at least one full extend/retract cycle.
  4. Re-adjust the flow regulator to its original setting. Feed rate should be 15-20mm per minute.
  5. Commence operation after function check/feed is ok and verified.
  6. If step 1 to 5 above does not fix the problem: Replace flow-regulator. (It is part of the spares-kit).

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## 6 MAINTENANCE

Repair and maintenance work on the saw shall only be performed by qualified personnel, specifically trained on this equipment.

### 6.1 After operations

- Plug hydraulic hoses to prevent hydraulic leaks and dirt to enter the hydraulic system.
- Clean the tool with fresh water. Apply an anti-corrosive layer on the tool when it is clean, WD40 or similar.
- Check hydraulic hoses, pipes, fittings and bolts, etc.
- Check the cutting blade for damage.
- When stored make sure the cylinders are fully retracted, to avoid corrosion.  
(Feed and clamp)
- Place tool in its original transport case/storage box and secure with straps.

### 6.2 Periodic maintenance

- Start with “After operations” maintenance procedure.
- A careful review of the entire tool is mandatory. This includes a visual check of the tool with hoses and a function test. Be sure that there`s no leaks and that the feeding rate is correct.
- Replace or fix parts if needed. Apply touch-up paint as required.

### 6.3 Repair work

Condition for repair work:

All hydraulic connection removed from the Subsea Saw.  
Cutting blade edge secured or blade removed.


### 6.4 Replacement of blade

Each saw is delivered with a blade attached to the saw. In order to replace the blade, unscrew the two M8 hexagon head bolts in the blade holder. The blade is now loose and can be removed from the saw.

In order to install a new blade, make sure the blade is orientated in the correct cutting direction. Install the bolts in reverse of removing the blade.

Tighten bolts.

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## 6.5 Replacement of motor

The motor is normally an item that will outlive the saw. However, in case it has been subject to contaminated oil, overpressure or other uncontrolled conditions, the motor might need to be replaced.

- Remove blade as per 6.4.
- Disconnect hydraulic hose connection and blank both sides with blind caps.
- These same applies to the case drain connection on the top of the motor.
- Remove bolt attachment between feed cylinder and motor interface.
- Remove centre bolt on blade holder if not already done.
- Remove four bolts from the underside of the saw. These bolts attach the motor to the slider (white of colour)

## 6.6 Replacement of gripper

The two grippers are replaceable and must be disconnected from their hinge points and the cylinder rod. First unscrew the bolt connection on the cylinder rod end. Then the connection/hinge point is unscrewed. The grippers are now loose.

To install grippers, insert the gripper between the body plates of the cutter and install the bolt connection. Nuts to be positioned on the upper side.

## 6.7 Replacement of gripper cylinders


Disconnect hydraulic hose connection and blank both sides with blind caps.

Disconnect the bolt connection of the cylinder rod and Gripper as per 6.6.

Disconnect the retaining ring on the end of each cylinder and remove the cylinder.

Installation is the reverse way.

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## 7 SPARE PART LIST


We can provide “Standard” or “Extended” version of spare parts kit.

<b>Standard spare parts</b>
1pc x Flow regulator: IKM-1100260
1pc x Blade Hub IKM.no: 4856-128
1pc x Blade Washer Hub IKM no: 4856-140
1pc x Hub spacer IKM no: 1100255
2pc x Hexagon head screw M8 x 30
1pc x Cylinder head cap screw M8 x 40
3pc x Nord-lock washer M8

<b>Extended spare parts</b>
1pc x Flow regulator: IKM-1100260
1pc x Blade Hub IKM.no: 4856-128
1pc x Blade Washer Hub IKM no: 4856-140
1pc x Hub spacer IKM no: 1100255
2pc x Hexagon head screw M8 x 30
1pc x Cylinder head cap screw M8 x 40
3pc x Nord-lock washer M8
1pc x Hydraulic motor IKM no: 1048754 (Charlynn)
1pc x Gripper cylinder IKM no: 1035062



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## 8 REVISION CHANGES

Revision	Procedure change	Author
01	<i>Original version</i>	AH
02	<i>Update</i>	KF
03	<i>Added section "Best Practice and Trouble shooting". New feed adjustment implemented.</i>	OG
04	<i>General Update + added repair work and maintenance</i>	TO

## 9 CONTACT INFORMATION


All enquiries relating to the tooling should be addressed to:

IKM Subsea AS  
 Nordlysveien 7,  
 N-4340 Bryne  
 Norway

Phone, 24/7 : +47 962 00 210 / Or IKM Subsea's hire-project PM

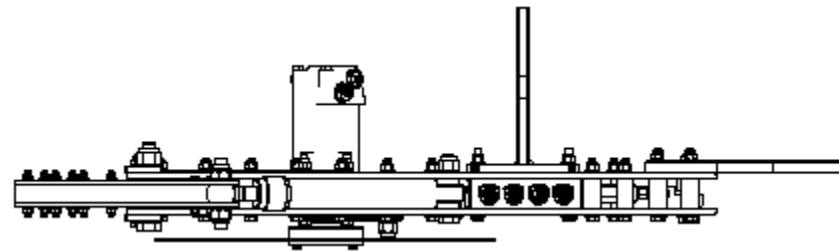
Mail : [Subseatools@ikm.no](mailto:Subseatools@ikm.no) / Or IKM Subsea's hire-project PM

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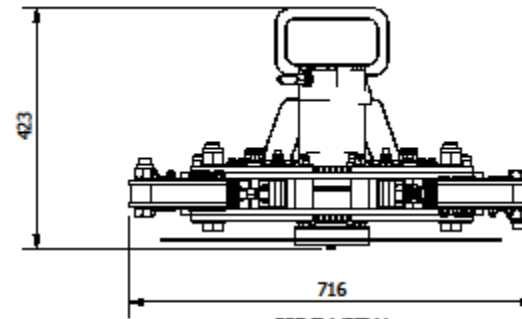


## 10 APPENDIX

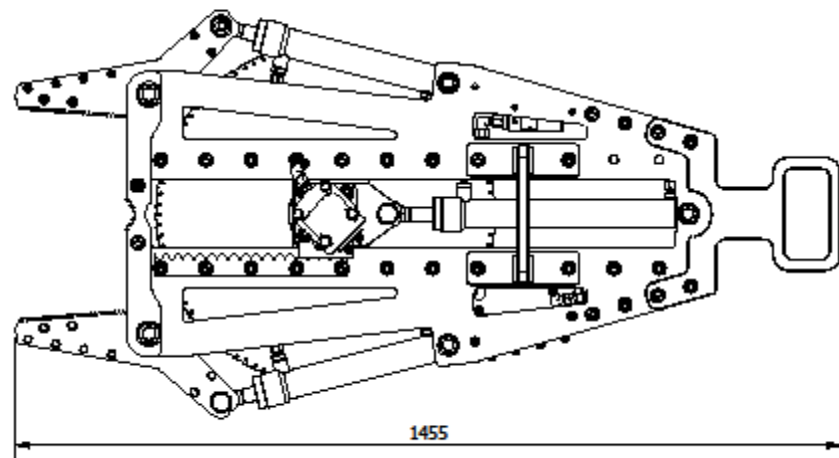
	<b>Doc number</b>	<b>Description</b>	<b>Rev</b>
<i>Appendix A</i>	<i>IKM-1047718, Rev.04</i>	<i>Drawings Subsea Saw 60-200 mm</i>	04
<i>Appendix B</i>		<i>Hydraulic Schematic</i>	



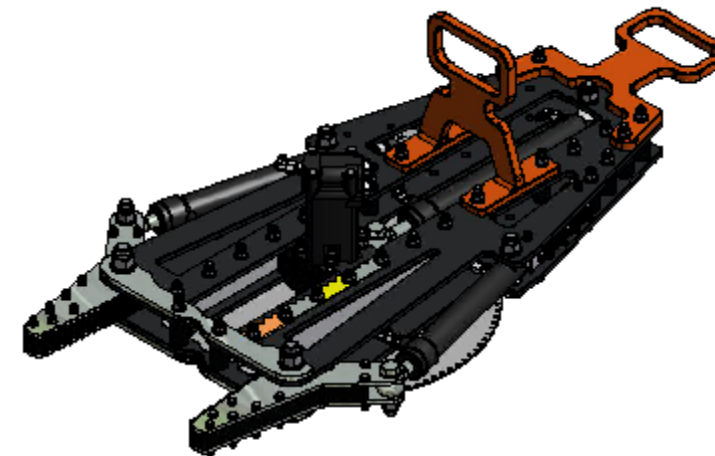
FRONT VIEW



SIDE VIEW




TOP VIEW

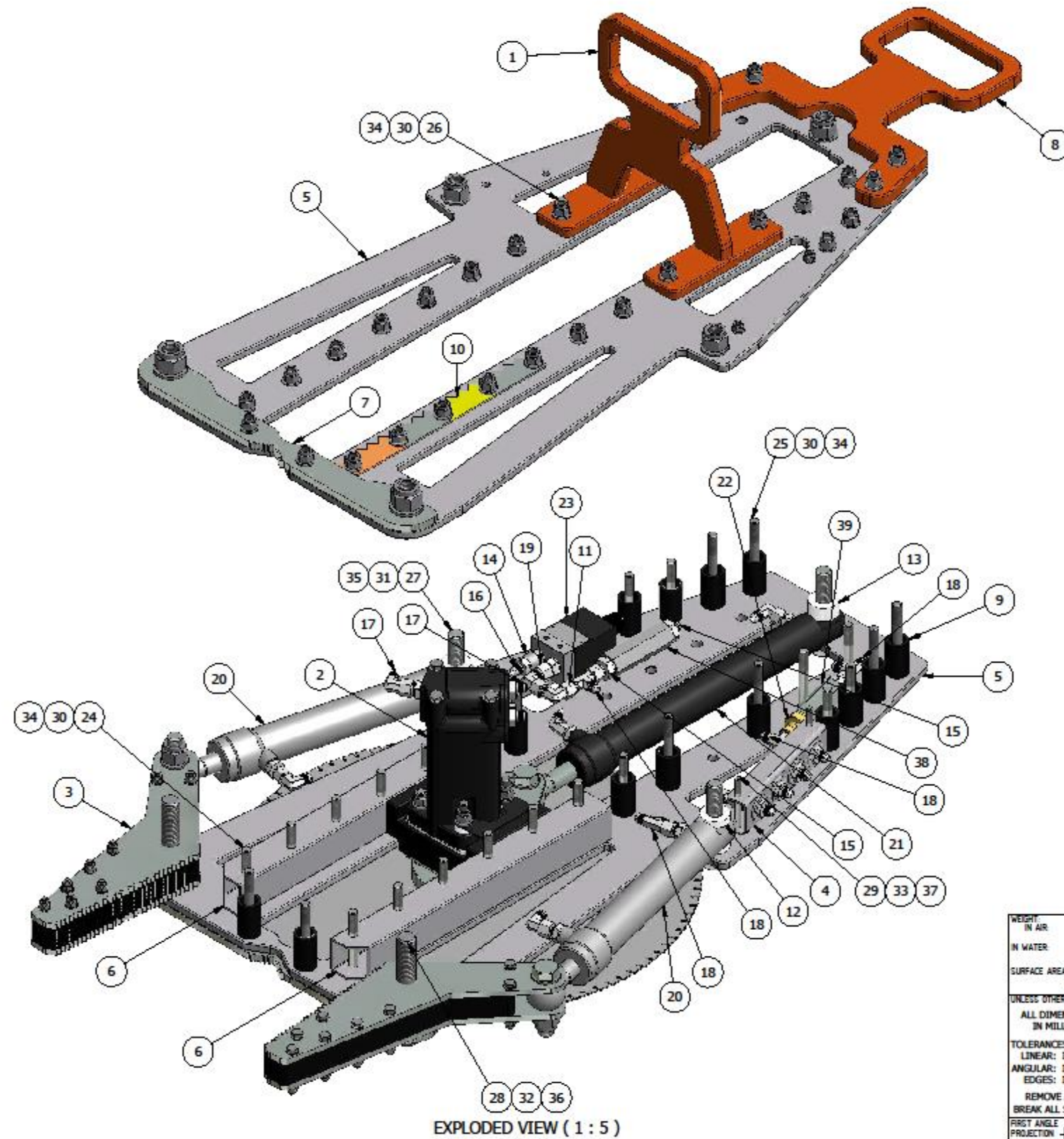


ISO VIEW


REV	DATE	DESCRIPTION	BY	CHKD	APPRD
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02	12.02.2015	RE-ISSUED FOR CONSTRUCTION	RH	AH	RH
01	28.05.2013	FOR CONSTRUCTION	JJK	EN	

WEIGHT: IN AIR: 101 kg IN WATER: 80 kg SURFACE AREA: 4909 cm <sup>2</sup> UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETRES TOLERANCES: LINEAR: ISO 2768-1 M ANGULAR: ISO 2768-1 M EDGES: ISO 2768-1 M REMOVE ALL BURRS BREAK ALL SHARP EDGES	 <b>IKM TECHNIQUE AS</b> Tomroseveien 12, 4315 SANDNES Tel.: 51 80 05 20 E-mail: ikmtechnique@ikm.no Web: www.ikm.no THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WHICH IS THE PROPERTY OF IKM TECHNIQUE AS. NONE OF THE INFORMATION CONTAINED HEREIN MAY BE DISCLOSED, REPRODUCED, DISTRIBUTED OR USED WITHOUT WRITTEN CONSENT FROM IKM TECHNIQUE AS.
PROJECT TITLE: P4856 DRAWING TITLE: SUBSEA SAW 60-200MM	SHEET SIZE: A3 SHEET NO.: 1 OF 3 SCALE: 1 : 10 LATEST REV.: 03





NOTES:  
 1. HOSES ARE NOT SHOWN IN DWG  
 FOR ASSEMBLY OF HOSES SEE SEPARATE DOCUMENT

WEIGHT: IN AIR: 101 kg IN WATER: 80 kg	 <b>IKM TECHNIQUE AS</b> Tomroseveien 12, 4315 SANDNES Tel.: 51 80 05 20 E-mail: ikmtechnique@ikm.no Web: www.ikm.no
SURFACE AREA: 4909 cm <sup>2</sup>	
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETRES	THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WHICH IS THE PROPERTY OF IKM TECHNIQUE AS. NONE OF THE INFORMATION CONTAINED HEREIN MAY BE DISCLOSED, REPRODUCED, DISTRIBUTED OR USED WITHOUT WRITTEN CONSENT FROM IKM TECHNIQUE AS.
TOLERANCES: LINEAR: ISO 2768-1 M ANGULAR: ISO 2768-1 M EDGES: ISO 2768-1 M	PROJECT TITLE: P4856
REMOVE ALL BURRS BREAK ALL SHARP EDGES	DRAWING TITLE: SUBSEA SAW 60-200MM
FIRST ANGLE PROJECTION	SHEET SIZE: A3    SHEET NO.: 2 OF 3    SCALE: 1 : 10 DRAWING NO.: 4856-010    LATEST REV.: 03

PARTS LIST						
ITEM	QTY	PART NUMBER	MATERIAL	DESCRIPTION	MASS	REV.
1	1	4856-011		ROV TOP HANDLE	7.61 kg	01
2	1	4856-012		MOTOR ASSEMBLIE	22.46 kg	02
3	2	4856-013		SUBSEA SAW 60 - 200 CLAW	5.44 kg	01
4	1	4856-014	Aluminium 6061, Welded	SUBSEA SAW CONNECTION HUB PLATE	0.24 kg	01
5	2	4856-120	Aluminium, 6082-T6	SUBSEA SAW 60 - 200 MAIN PLATE	9.45 kg	01
6	2	4856-121	Aluminium, 6082-T6	MOTOR SLIDE BARS	0.66 kg	01
7	2	4856-122	Stainless Steel, AISI 316L	SUBSEA SAW GRIP PLATE	1.78 kg	01
8	1	4856-123	Stainless Steel, AISI 316L	ROV REAR HANDLE	6.14 kg	01
9	14	4856-131	POM-C ( black )	POM SPACER	0.02 kg	01
10	1	4856-132	Stainless Steel, AISI 316L	SAW BLADE INDICATOR	0.27 kg	01
11	1	4856-134	Aluminium, 6082-T6	FLOW CONTROL VALVE BASE PLATE	0.14 kg	01
12	4	4856-137	PEHD 1000 ( natural / white )	HYDRAULIC CLAW CYLINDER SPACER	0.01 kg	01
13	1	4856-138	PEHD 1000 ( natural / white )	HYDRAULIC CYLINDER REAR SPACER	0.02 kg	01
14	1	4856-7005 G UFG 3_8 adapter	As Supplied		0.01 kg	01
15	5	4856-7616 J GE G 1_2		STRAIGHT FITTING 1/2" JIC - 3/4 BSP	0.01 kg	01
16	2	4856-7616 J GE G 3_8		STRAIGHT FITTING 3/8" JIC - 1/4" BSP	0.01 kg	01
17	3	4856-7660 J EVW		90° ELBOW FITTING 3/8" JIC	0.01 kg	01
18	5	4856-7663 J EVL			0.01 kg	01
19	1	4856-7666 J EVGE adapter			0.01 kg	01
20	2	4856-HYDRAULIC CLAW CYLINDER		PMC 3060007 NH30-SD-40/25 X 200-S	6.34 kg	01
21	1	4856-HYDRAULIC FEED CYLINDER		PMC 3040011 NH30-SD-40/20 X 300-S	7.93 kg	01
22	1	4856-SG3 SB Adapter			0.02 kg	01
23	1	7146-Flow regulator	As Supplied	672878 QV-06/1 FLOW CONTROL VALVE	0.2 kg	01
24	20	ISO 4014 - M12 x 100	Stainless Steel, 440C	Hexagon head bolt - product grades A and B	0.1 kg	

03

PARTS LIST						
ITEM	QTY	PART NUMBER	MATERIAL	DESCRIPTION	MASS	REV.
25	8	ISO 4014 - M12 x 120	Stainless Steel, 440C	Hexagon head bolt - product grades A and B	0.12 kg	
26	2	ISO 4014 - M12 x 55	Stainless Steel, 440C	Hexagon head bolt - product grades A and B	0.06 kg	
27	3	ISO 4014 - M20 x 110	Stainless Steel, 440C	Hexagon head bolt - product grades A and B	0.34 kg	
28	2	ISO 4014 - M24 x 140	Stainless Steel, 440C	Hexagon head bolt - product grades A and B	0.62 kg	
29	2	ISO 4014 - M8 x 80	Stainless Steel, 440C	Hexagon head bolt - product grades A and B	0.04 kg	
30	30	ISO 7041 - M12	Stainless Steel	Prevailing torque type hexagon nuts (with non-metallic insert) style2 - property class 9 and 12	0.02 kg	
31	3	ISO 7041 - M20	Stainless Steel	Prevailing torque type hexagon nuts (with non-metallic insert) style2 - property class 9 and 12	0.1 kg	
32	2	ISO 7041 - M24	Stainless Steel	Prevailing torque type hexagon nuts (with non-metallic insert) style2 - property class 9 and 12	0.16 kg	
33	2	ISO 7041 - M8	Stainless Steel	Prevailing torque type hexagon nuts (with non-metallic insert) style2 - property class 9 and 12	0.01 kg	
34	60	ISO 7089 - 12 - 140 HV	Stainless Steel	Plain washers - Normal series - Product grade A	0.01 kg	
35	6	ISO 7089 - 20 - 140 HV	Stainless Steel	Plain washers - Normal series - Product grade A	0.02 kg	
36	4	ISO 7089 - 24 - 140 HV	Stainless Steel	Plain washers - Normal series - Product grade A	0.03 kg	
37	4	ISO 7089 - 8 - 140 HV	Stainless Steel	Plain washers - Normal series - Product grade A	0 kg	
38	1	Pressure relief valve SV53C	As Supplied	PRESSURE RELIEF VALVE SV53C	0.07 kg	01
39	1	Setback valve	Stainless Steel, AISI 316L	SETBACK VALVE	0.42 kg	01

WEIGHT IN AIR	kg	 <b>IKM TECHNIQUE AS</b> Tomroseveien 12, 4315 SANDNES Tel.: 51 80 05 20 E-mail: ikmtechnique@ikm.no Web: www.ikm.no
IN WATER	kg	
SURFACE AREA	cm <sup>2</sup>	
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TOLERANCES: LINEAR: ISO 2768-1 M ANGULAR: ISO 2768-1 M EDGES: ISO 2768-1 M		PROJECT TITLE
REMOVE ALL BURRS BREAK ALL SHARP EDGES		P4856
FIRST ANGLE PROJECTION		DRAWING TITLE
SHEET SIZE	A3	SHEET NO. 3 OF 3
DRAWING NO.		SCALE 1 : 10 LATEST REV. 03

Appendix B

