Operator's Manual

ROV Winch

DWRW-1050

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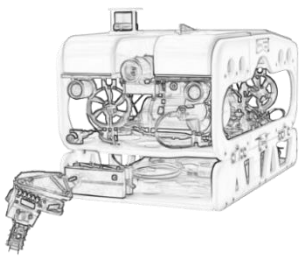

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1 Introduction

1.1 General

Specifications: DWTEK reserves the right to make changes to specifications without prior notice, and without any obligation to incorporate new features into previously released products, irrespective of their sale status. Such modifications will be made at the sole discretion of DWTEK.

Damage in Shipment: Every new product undergoes a thorough examination and inspection before being shipped from DWTEK's facilities. Upon receipt by the receiving party, it is essential to meticulously inspect and conduct operational tests on the product. In the event of any damage to the product, the receiving party should file a claim with the carrier. Damaged new or repaired products that have been affected during transit should not be returned to DWTEK unless explicit shipping instructions have been obtained from DWTEK beforehand.

Repairs: In case of any malfunction, the subsequent actions need to be followed:

1. Contact DWTEK and provide comprehensive details about the issue. Once DWTEK receives this information, the company will decide whether to issue service instructions or furnish complete shipping information for the equipment's return.
2. Upon receiving the shipping instructions, send the product(s) with prepaid shipping. Repair costs will be assessed, and the client will be notified before any repairs to the identified fault(s) are initiated.
3. Subsequently, if the fault is attributed to misuse or falls outside the warranty coverage, the client can provide DWTEK with an authorized purchase order to encompass the repair expenses.

1.2 Precautions

Table 1 – Precautions

	The “DANGER” symbol indicates a hazardous situation which, if not avoided, will result in death or serious injury. Carefully read the message that follows to prevent serious injury or death.
	The “WARNING” symbol indicates a hazardous situation which, if not avoided, could result in death or serious injury. Carefully read the message that follows to prevent serious injury or death.
	The “CAUTION” symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, or equipment damage. Carefully read the message that follows to prevent minor or moderate injury.
	The “NOTICE” symbol alerts to a situation that is not related to personal injury but may cause equipment damage
	Do not put hands near it when machine operating.

2 Specifications

This section elucidates the specifications and delineates the capabilities of the Winch produced by DWTEK.

2.1 Major Components

The umbilical winch assembly is responsible for storing and managing the ROV umbilical cable. It comes equipped with an automated, chain-driven spooling mechanism designed to ensure the uniform layering of the umbilical cable onto the winch barrel. Additionally, the umbilical winch integrates the vehicle/umbilical electrical system to facilitate the seamless transfer of electrical power to the vehicle.

2.2 Umbilical Winch

The core elements integrated within the typical umbilical winch assembly consist of the following:

• A winch barrel crafted from robust carbon steel, boasting welded barrel flanges that offer robust support for the multiple tiers of the umbilical cable.

• A hydraulic drive motor utilizing a fixed displacement, bent-axis configuration. The winch drive motor is affixed directly to the input housing of the winch barrel drive gearbox, ensuring a compact and well-protected drive system configuration.

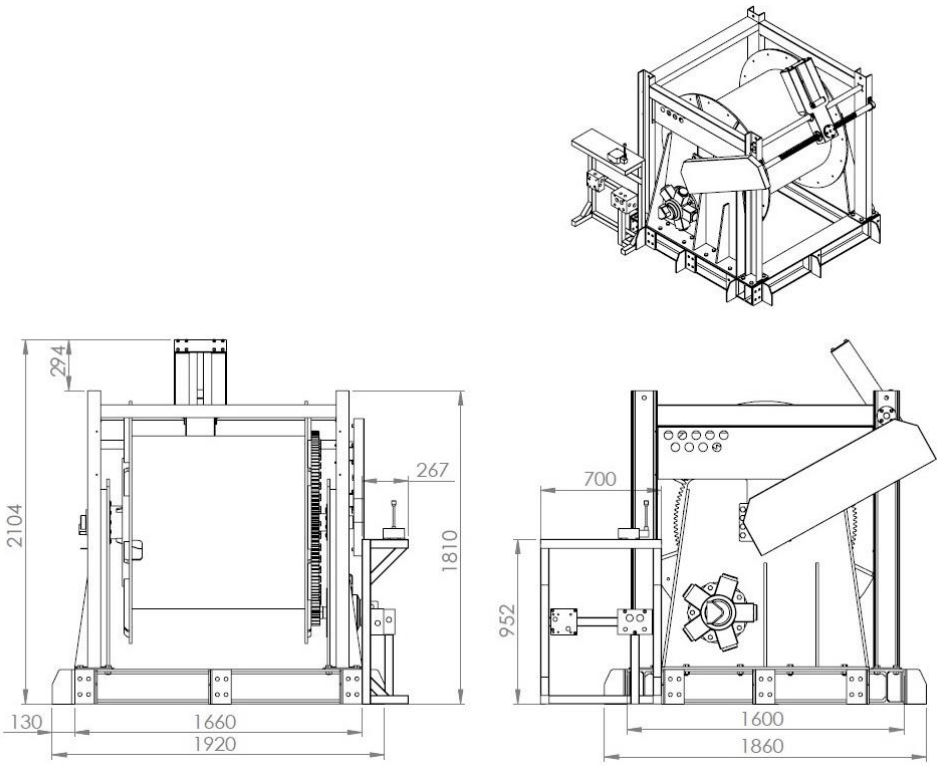


Figure 1 –The appearance dimensions of winch

Table 2 – Winch Specification

Winch	
MECHANICAL	
Weight	2100 kg (Excluding cables/ Oil system.)
Rated Line Pull	5000 kg
Main Structural Material	Low-carbon steel
Gearing	7.6 : 1
Drum Size –Dia x L	1000 x 1000mm
OPERATING CONDITIONS	
Max. Operating Pressure	260 bar
Max. CONT. Speed	32 Rpm
Recommended Operating Speed	Below 9 Rpm

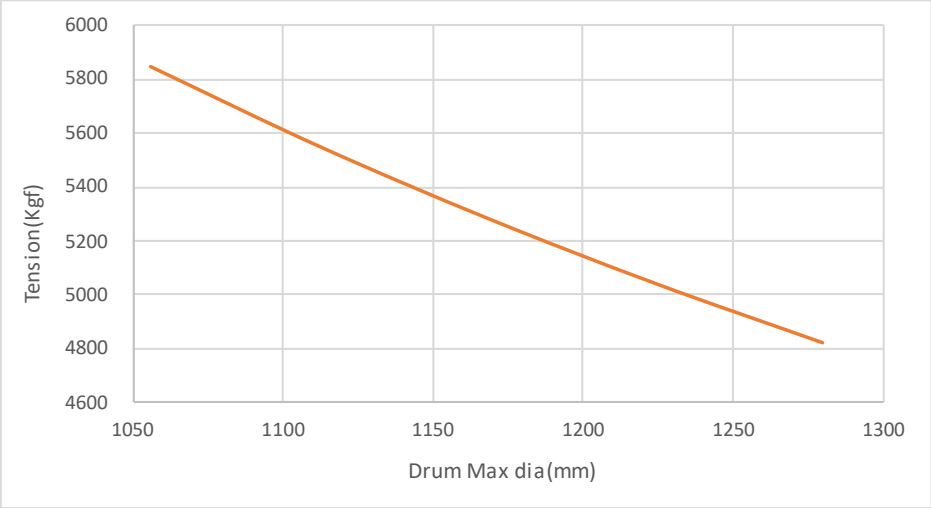


Figure 2 – Winch performance curve (200bar)

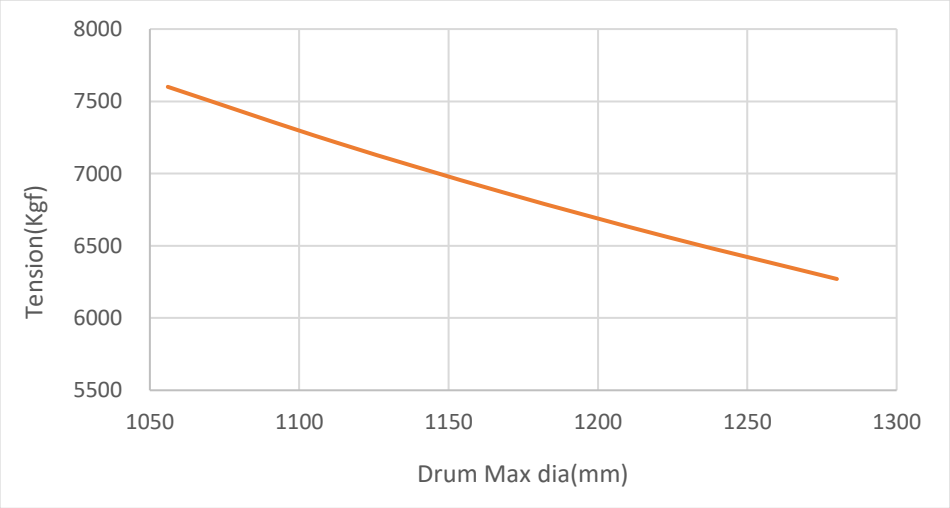


Figure 3 – Winch performance curve (260bar)

3 Installation

3.1 SYSTEM INSTALLATION GUIDE

Make sure all the connections are correct, and follow the instruction listed as below to power the winch.

1. Connect the 3/4" fitting on the control valve assembly to the outlet port of the HPU; Connect the 1" fitting to the return port of the HPU.
2. Connect the 3/4" fittings (A1, B1) on the solenoid control valve assembly to the hydraulic motor's input ports; Connect the 1/2" fitting to the hydraulic motor's front-facing return port.
3. Before starting the HPU power, double-check that all fittings have been properly installed.
4. With no load, turn both knobs of the counterbalance valve counterclockwise to their maximum positions, then lock them simultaneously in a clockwise manner to adjust the braking force provided by the hydraulic system during idle.
5. The speed adjustment device has numbers ranging from 0 to 600 for reference; however, the final speed may vary depending on the HPU flow rate.
6. After starting the HPU, verify if there's a slight increase in hydraulic pressure on the pressure gauge of the manual switch.
7. Ensure clearance around the winch and then operate the manual switch to confirm the expected direction of the Winch rotation. Swapping the positions of the hydraulic motor's input hoses will reverse the rotation direction.

3.2 PRE START UP CHECKS AND SET TO WORK

This section elucidates the suggested protocols essential prior to commencing system operation, ensuring a thorough assessment of equipment suitability for secure and efficient functioning. It also delineates the preparatory measures to be undertaken in readiness for system operation.

3.2.1 Pre Start Up Checks

The WINCH system represents a sophisticated apparatus integrating numerous mechanical and hydraulic functionalities. Hence, it is prudent to conduct a preliminary assessment to ensure the equipment's operational readiness, albeit within defined parameters.
The suitable scope of pre-startup checks involves conducting a visual inspection of the equipment. The ensuing procedure is designed to function as a checklist or a memory aid, facilitating the systematic completion of the visual checks.

Inspect the primary control lever of the umbilical winch. Confirm that the lever rests in a neutral position when not in use, moves freely when manually activated, and reverts to the neutral position upon release, aided by a spring mechanism.

Thoroughly inspect the vicinity around and beneath the hydraulic power unit located at the drive end of the umbilical winch. Ensure there are no indications of present or past hydraulic fluid leakage.
Follow the course of all hydraulic hoses integrated into the system. Guarantee that the hoses are shielded against the possibility of entanglement and validate that they exhibit no visible signs of external damage.
Inspect the oil level gauge located on the external surface of the hydraulic fluid reservoir. Ascertain that the displayed oil level falls within 50 mm of the upper demarcation line.

4 OPERATING INSTRUCTIONS

This section outlines the procedure and governing mechanism for operating the system, encompassing a comprehensive portrayal of the control functionalities. To comprehensively elucidate the system's operation, this section also incorporates a sequential breakdown of the steps involved in utilizing the system for both deploying and retrieving the ROV System.

4.1 Control Functions and Locations

The operator controls of the system encompass:

- Controls for initiating the Hydraulic Power Unit (HPU) and executing Emergency Stop.
- Hydraulic Control Lever governing winch operations.

The control functionalities include:

- A single-axis lever with spring return, employed to manage the speed and direction of the umbilical winch barrel.
- The primary system pressure gauge.

The single-axis spring return lever for controlling the umbilical winch offers a level of proportional control metering, granting the operator the ability to finely adjust the speed and direction of the function.

4.2 Winch Rotational Speed Control

The appearance of the speed adjustment device is as shown in the figure. The device is equipped with numbers from 0 to 600 for speed adjustment reference. The final rotational speed is determined by the flow rate provided by the HPU, and the range from 0 to 600 is for relative reference only, facilitating speed adjustment when using the same HPU as the power source.

The formula relating flow rate to rotational speed is as follows:
Drum V(Rpm) = HPU flow (L/min) / 1.25 (L/Rev) / 7.6 (Reduction ratio)

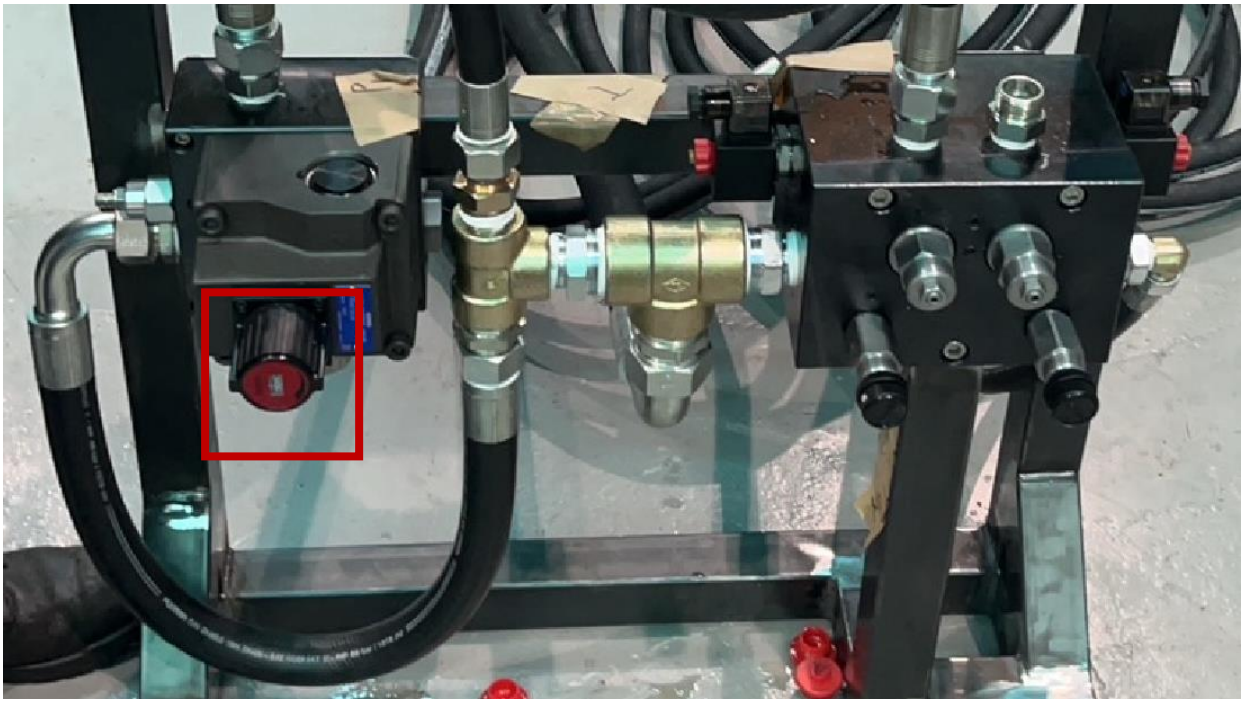


Figure 4– Winch Speed Adjustment Device

Warning!!

1. Suggestion: Please keep the rotational speed below 9 RPM.

2. When the system is initially connected, it may not start rotating immediately due to the presence of air. It requires input of hydraulic oil for a period of time before it begins to rotate.

4.3 Winch Counterbalance Valve Strength Setting

The counterbalance valve adjusts the resistance force that the winch can withstand when it is not in operation. The actual value may vary depending on the pressure provided by the HPU.

To adjust the counterbalance valve, turn it counterclockwise to the loosest position for the lowest resistance force. Then, gradually increase the resistance force by turning it clockwise.

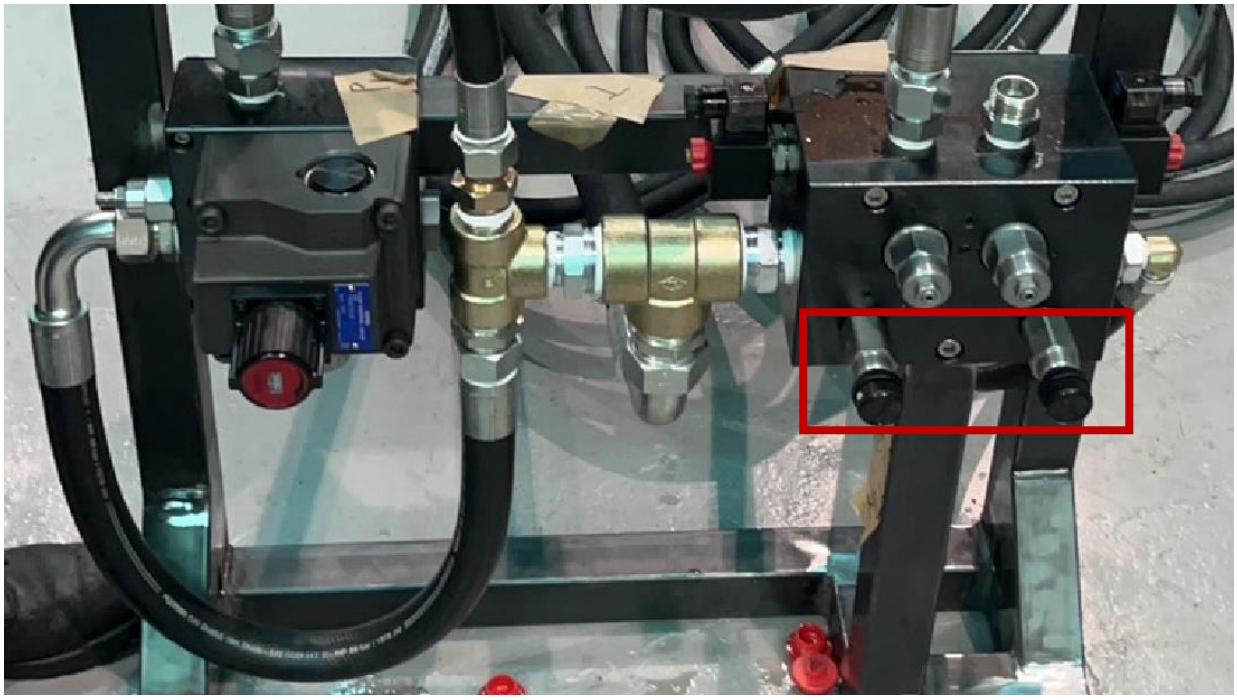


Figure 5 – Counterbalance Valve Adjusts

5 Maintenance

Included are suggested standard record charts designed for monitoring routine maintenance tasks, along with a chart detailing the appropriate tightening torque specifications for all fastenings within the system.

Table 3 –Tightening Torques for Fastenings

TIGHTENING TORQUES (N.M)	
Size	Grade 8.8
M12 x 1.75P	79
M16 x 2.0P	198
M18 x 2.5P	283
M20 x 2.5P	402

Torque values are intended for lubricated fasteners that are in sound condition and devoid of any burrs.

5.1 Daily Maintenance

The subsequent step-by-step procedure delineates the fundamental daily maintenance level deemed essential for the uninterrupted functioning of the Winch system. This protocol does not eliminate the possibility of conducting supplementary inspection or service tasks when they are proven to be required.

1. Inspect the primary control lever of the Winch. Confirm that the lever remains in a neutral position while at rest, is unimpeded in its manual movement, and promptly returns to the neutral position upon release, facilitated by the spring mechanism.
2. Follow the path of all hydraulic hoses integrated into the system. Assure that the hoses are not susceptible to entanglement and confirm that there are no observable signs of external damage. Minor abrasions can be identified and documented for more meticulous monitoring of their condition. However, substantial abrasion damage (exposing the steel or fiber reinforcement of the hose) or puncture damage (resulting in deformation of the steel or fiber reinforcement or causing hose leakage) necessitates the replacement of the hose assembly prior to any further operation of the unit.
3. Inspect the vicinity surrounding and beneath the hydraulic power unit of the umbilical winch. Confirm the absence of any indications of hydraulic fluid leakage around the controls. If any evidence of hydraulic fluid leakage is detected, promptly undertake the necessary measures to halt further leakage.

4. Inspect the protective paint coating across the entire system for signs of abrasion or penetration damage. Address areas of notable damage promptly by carrying out necessary repairs. Minor damage can be acknowledged and documented for subsequent rectification during the weekly routine maintenance procedure.
5. Perform a visual inspection of all high-strength friction grip fasteners (bolts) utilized within the unit to ascertain the absence of visible signs indicating a decrease in tension (backing off). Re-tighten fasteners as necessary, adhering to the correct tightening torques referenced in the table provided within this section of the manual.

5.2 Weekly Maintenance

The subsequent step-by-step procedure outlines the essential weekly maintenance regimen deemed suitable for the uninterrupted operation of the Winch system. This protocol encompasses the minimum daily maintenance level as described in section 5.1 and, likewise, does not discourage the implementation of additional inspection or service tasks when deemed necessary.
1. Inspect the primary control lever of the Winch system. Confirm that the lever remains in a neutral position while at rest, can be moved manually without obstruction, and reverts to the neutral position upon release, aided by the spring mechanism.
2. Follow the path of all hydraulic hoses integrated into the system. Confirm that the hoses are positioned to avoid entanglement and inspect them for any visible signs of external damage. Minor abrasions should be noted and recorded for comprehensive monitoring of their condition. In cases of significant abrasion damage (exposing the steel or fiber reinforcement of the hose) or penetrative damage (resulting in deformation of the steel or fiber reinforcement or causing hose leakage), the hose assembly must be replaced prior to any further operation of the unit.
3. Inspect the vicinity surrounding and underneath the hydraulic power unit mounted on the umbilical winch. Confirm the absence of any indications of hydraulic fluid leakage around the controls. If any signs of hydraulic fluid leakage are identified, promptly take necessary measures to prevent any further leakage.
4. Inspect the hydraulic oil level in the fluid reservoir and add more oil if required. It's important to top up the oil level only when the A frame is positioned in the fully inboard operating position.
5. Inspect the protective paintwork across the entire system for any signs of abrasion or penetrative damage. Address areas with notable damage promptly by conducting necessary repairs. Minor damage can be noted and documented for subsequent rectification during the weekly routine maintenance procedure.

6. Conduct a visual inspection of all high-strength friction grip fasteners (bolts) employed in the unit to ensure that there are no visible indications of tension loss (backing off). Re-tighten fasteners as needed, referencing the table within this section of the manual for accurate tightening torques for bolts and similar components.
7. Inspect the visible outer surface of the vehicle umbilical cable wound around the umbilical winch barrel. Confirm that the cable is devoid of any observable external damage.

6 MATERIALS

The system is crafted using the following primary materials:

Table 4 – Primary materials

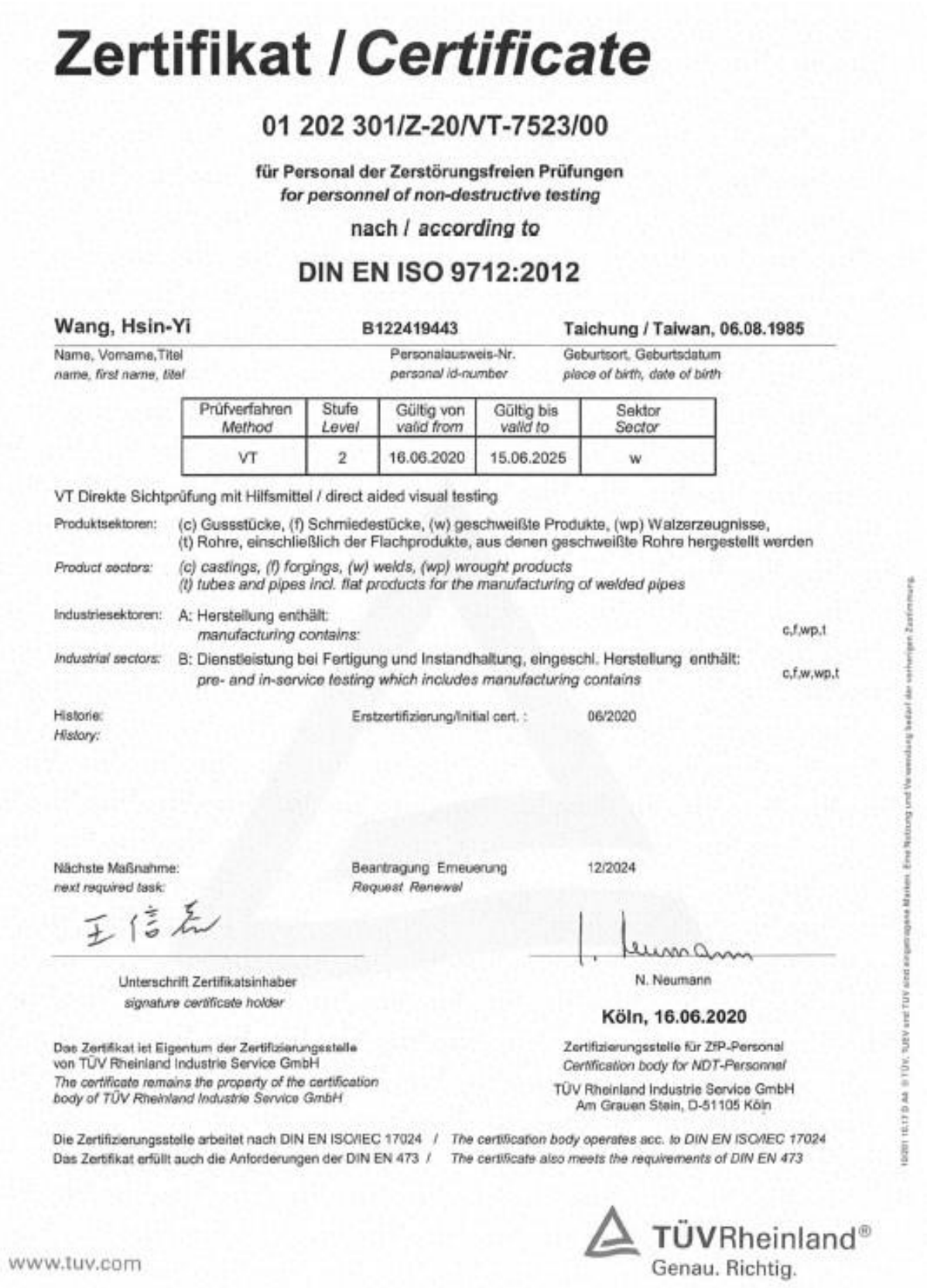
Structural steelwork	S41
Nonstructural steel components	S41、SUS304、S45C
Structural pivot pins etc.	S41、SUS304、S45C
Nonstructural retainers etc.	S41、SUS304、AL6061-T6
Fasteners	S45C、SUS304、SCM440
Hydraulic fittings	S41、AL6061-T6
Hydraulic pipework	S41、rubber

6.1 Protective Coatings

Table 5 – Protective coatings

Primer	Epoxy anti-rust primer
Finish	Epoxy topcoat
Finish color	Jade green

6.2 Certification



Zertifikat / *Certificate*

01 202 301/Z-20/VT-7523/00

für Personal der Zerstörungsfreien Prüfungen
for personnel of non-destructive testing

nach / *according to*

DIN EN ISO 9712:2012

Wang, Hsin-Yi	B122419443	Taichung / Taiwan, 06.08.1985
Name, Vorname,Titel *name, first name, titel*	Personalausweis-Nr. *personal id-number*	Geburtsort, Geburtsdatum *place of birth, date of birth*

Prüfverfahren *Method*	Stufe *Level*	Gültig von *valid from*	Gültig bis *valid to*	Sektor *Sector*
VT	2	16.06.2020	15.06.2025	w

VT Direkte Sichtprüfung mit Hilfsmittel / direct aided visual testing

Produktsektoren: (c) Gussstücke, (f) Schmiedestücke, (w) geschweißte Produkte, (wp) Walzerzeugnisse, (t) Rohre, einschließlich der Flachprodukte, aus denen geschweißte Rohre hergestellt werden

Product sectors: *(c) castings, (f) forgings, (w) welds, (wp) wrought products (t) tubes and pipes incl. flat products for the manufacturing of welded pipes*

Industriesektoren: A: Herstellung enthält: *manufacturing contains:* c,f,wp,t

Industrial sectors: B: Dienstleistung bei Fertigung und Instandhaltung, eingeschl. Herstellung enthält: *pre- and in-service testing which includes manufacturing contains* c,f,w,wp,t

Historie: Erstzertifizierung/Initial cert. : 06/2020
History:

Nächste Maßnahme: Beantragung Erneuerung 12/2024
next required task: *Request Renewal*

王信宏

Unterschrift Zertifikatsinhaber
signature certificate holder

N. Neumann

Köln, 16.06.2020

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TÜV Rheinland Industrie Service GmbH
Am Grauen Stein, D-51105 Köln

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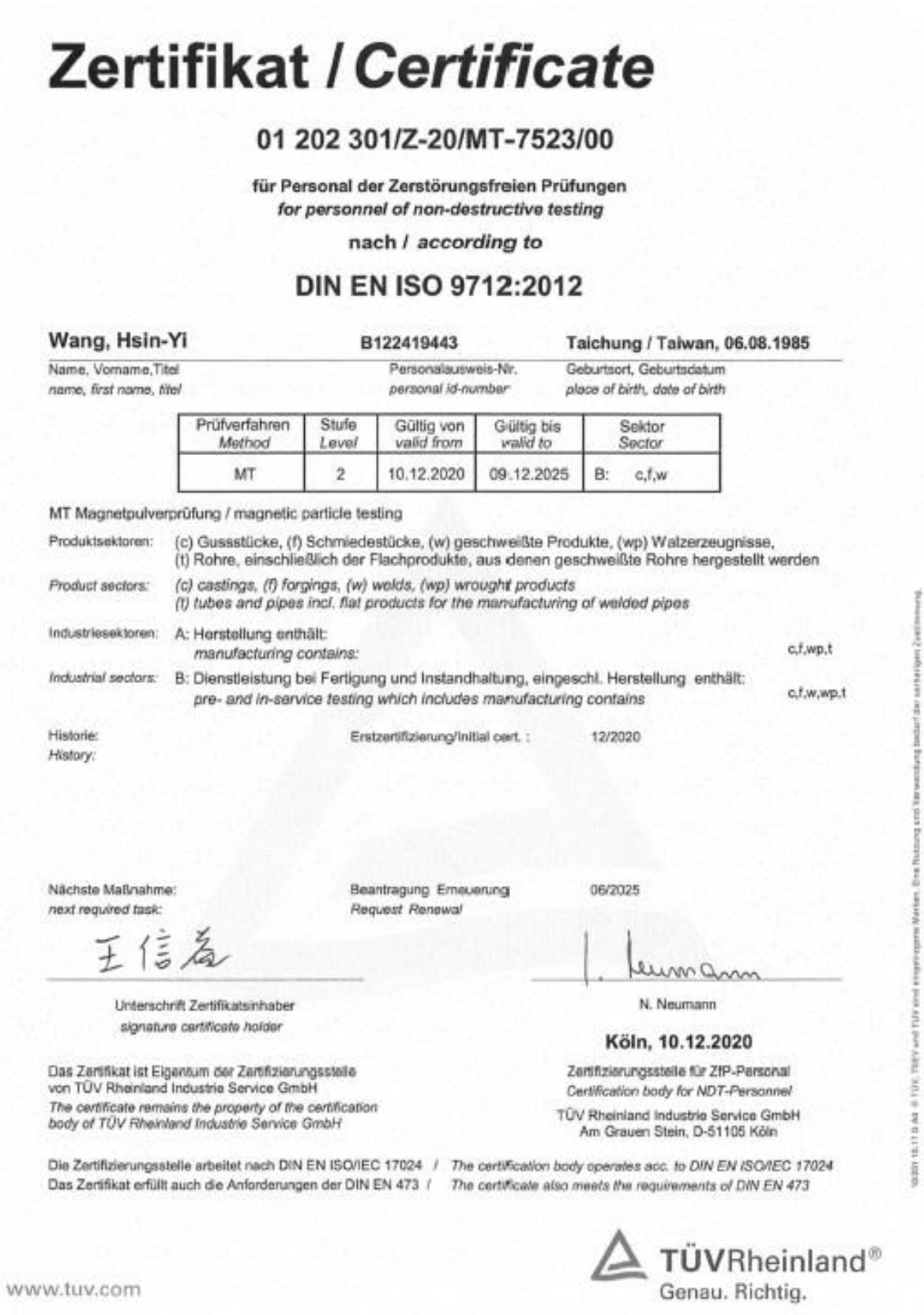
Figure 6 – Report of Visual Examination



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für Personal der Zerstörungsfreien Prüfungen
for personnel of non-destructive testing

nach / *according to*

DIN EN ISO 9712:2012

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Name, Vorname,Titel *name, first name, titel*	Personalausweis-Nr. *personal id-number*	Geburtsort, Geburtsdatum *place of birth, date of birth*

Prüfverfahren *Method*	Stufe *Level*	Gültig von *valid from*	Gültig bis *valid to*	Sektor *Sector*
MT	2	10.12.2020	09.12.2025	B: c,f,w

MT Magnetpulverprüfung / magnetic particle testing

Produktsektoren: (c) Gussstücke, (f) Schmiedestücke, (w) geschweißte Produkte, (wp) Walzerzeugnisse, (t) Rohre, einschließlich der Flachprodukte, aus denen geschweißte Rohre hergestellt werden

Product sectors: (c) castings, (f) forgings, (w) welds, (wp) wrought products (t) tubes and pipes incl. flat products for the manufacturing of welded pipes

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Historie: Erstzertifizierung/Initial cert. : 12/2020
History:

Nächste Maßnahme: Beantragung Erneuerung 06/2025
next required task: Request Renewal

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N. Neumann

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Figure 7 – Report of Magnetic Particle Examination

7 SYSTEM DRAWINGS

7.1 Winch Assembly

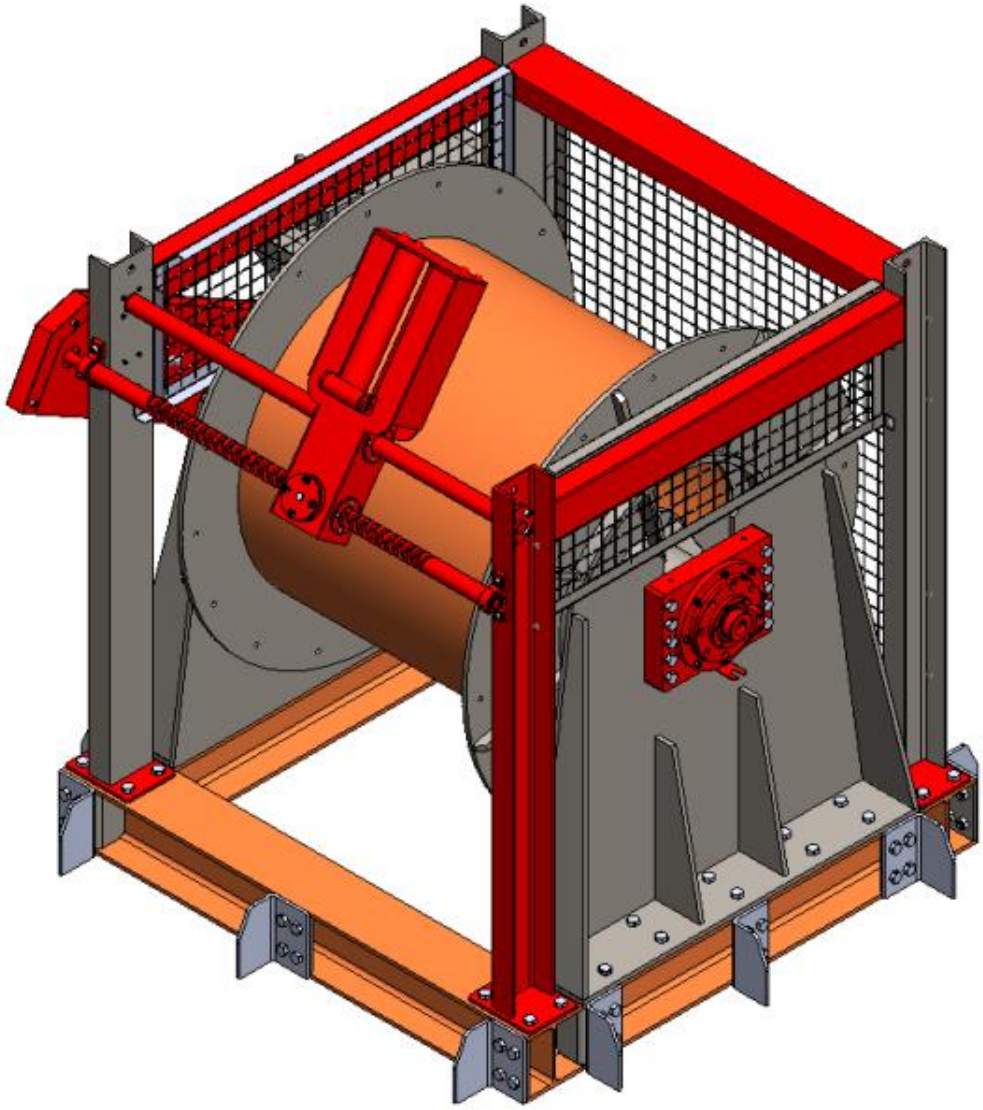

Figure 8 – Winch Assembly

7.2 Hydraulic Diagram

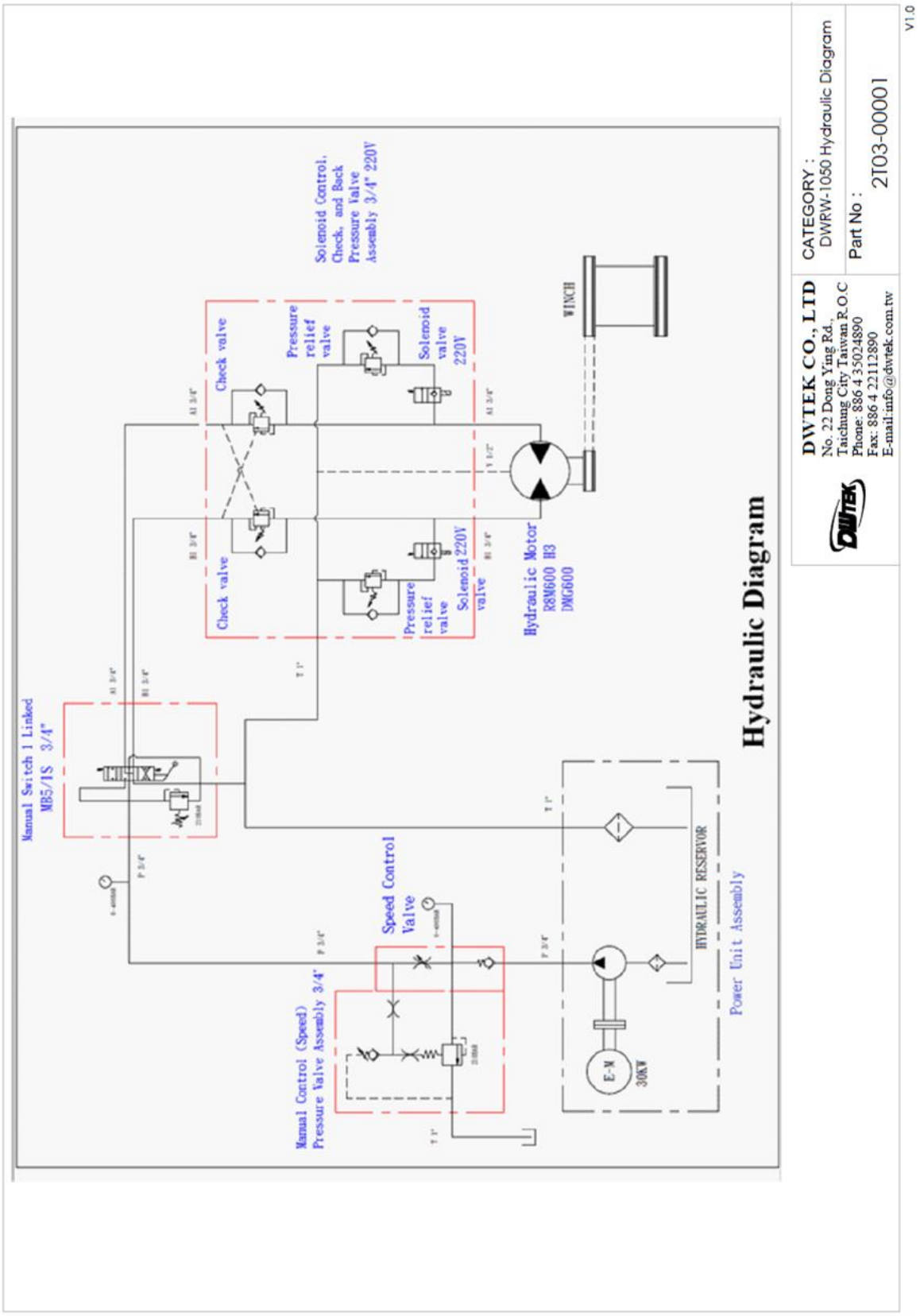

Figure 9 – DWRW-1050 Hydraulic Diagram(2T03-00001)

8 Appendix

8.1 Spares

Table 6 – Spares

No.	PART No.	TITLE	QTY.
1	2D011-00162	Reciprocating screw	1pcs
2	2D011-00121	Sprocket	1pcs
3	2D011-00122	Main body end sprocket	1pcs
4	2P001-D122M8-12540	A2-70 M8x1.25Px40 Socket Head CAP Screw	6pcs
5	2P001-D122M10-15050	A2-70 M10x1.13Px50 Socket Head CAP Screw	2pcs
6	2P001-D122M10-15016	A2-70 M10x1.6Px16 Socket Head CAP Screw	9pcs
7	2D011-00160	Traversing device guide rod	1pcs
8	2D011-00159	Guide rod fixed block	2pcs

8.2 Exploded View

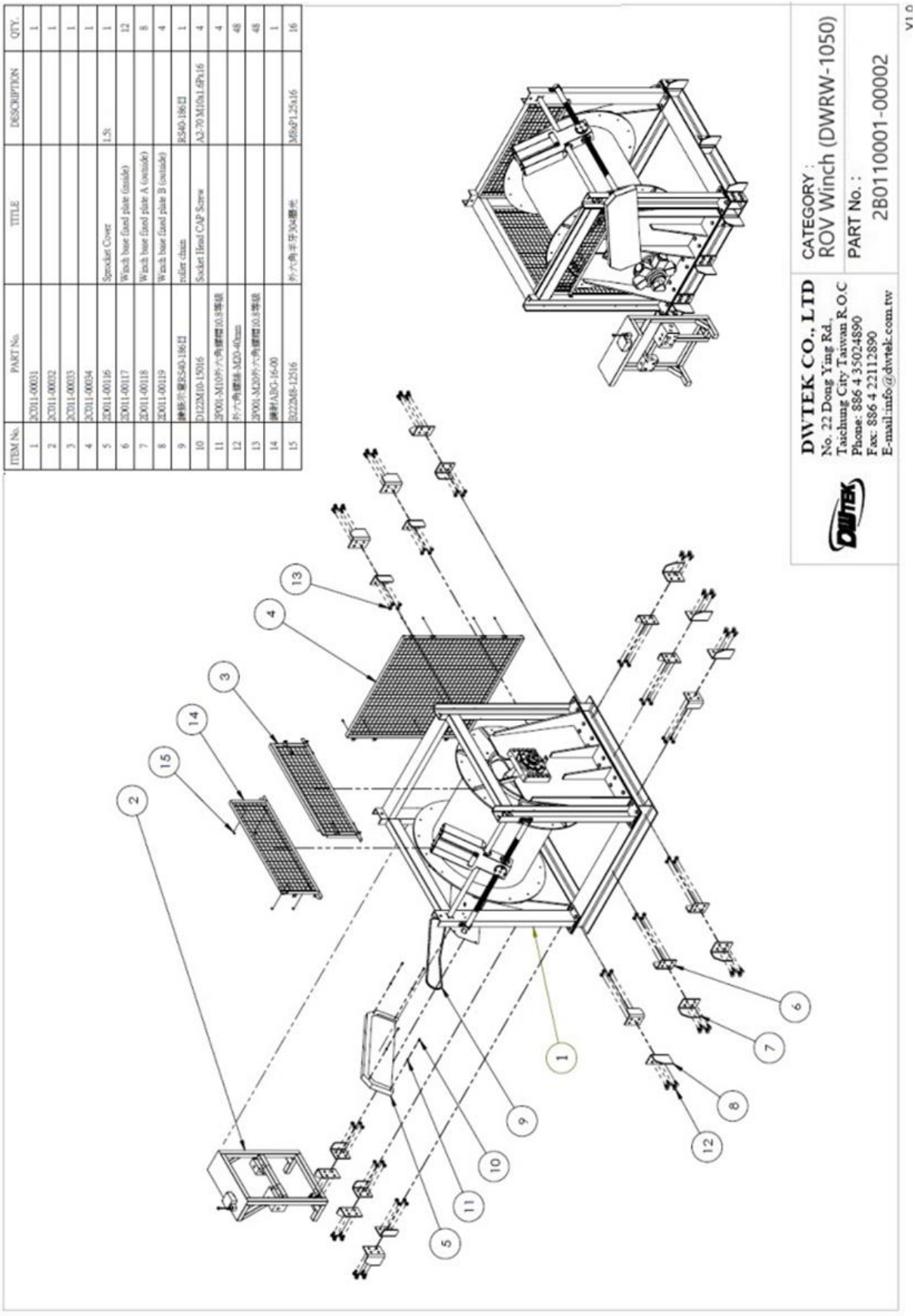

Figure 10 – ROV Winch (DWRW-1050) (2B0110001-00002)

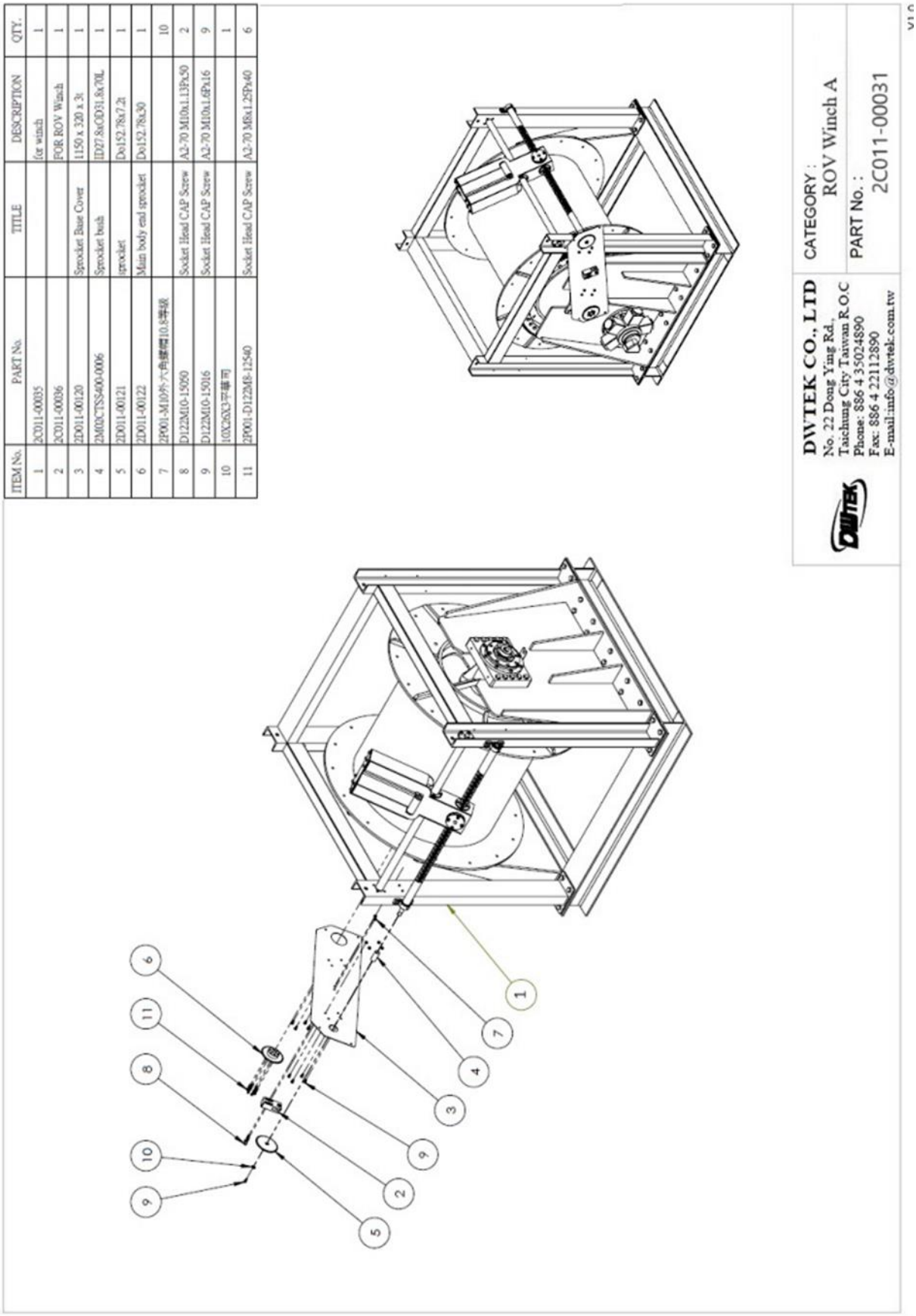

Figure 11 – ROV Winch A (2C011-00031)

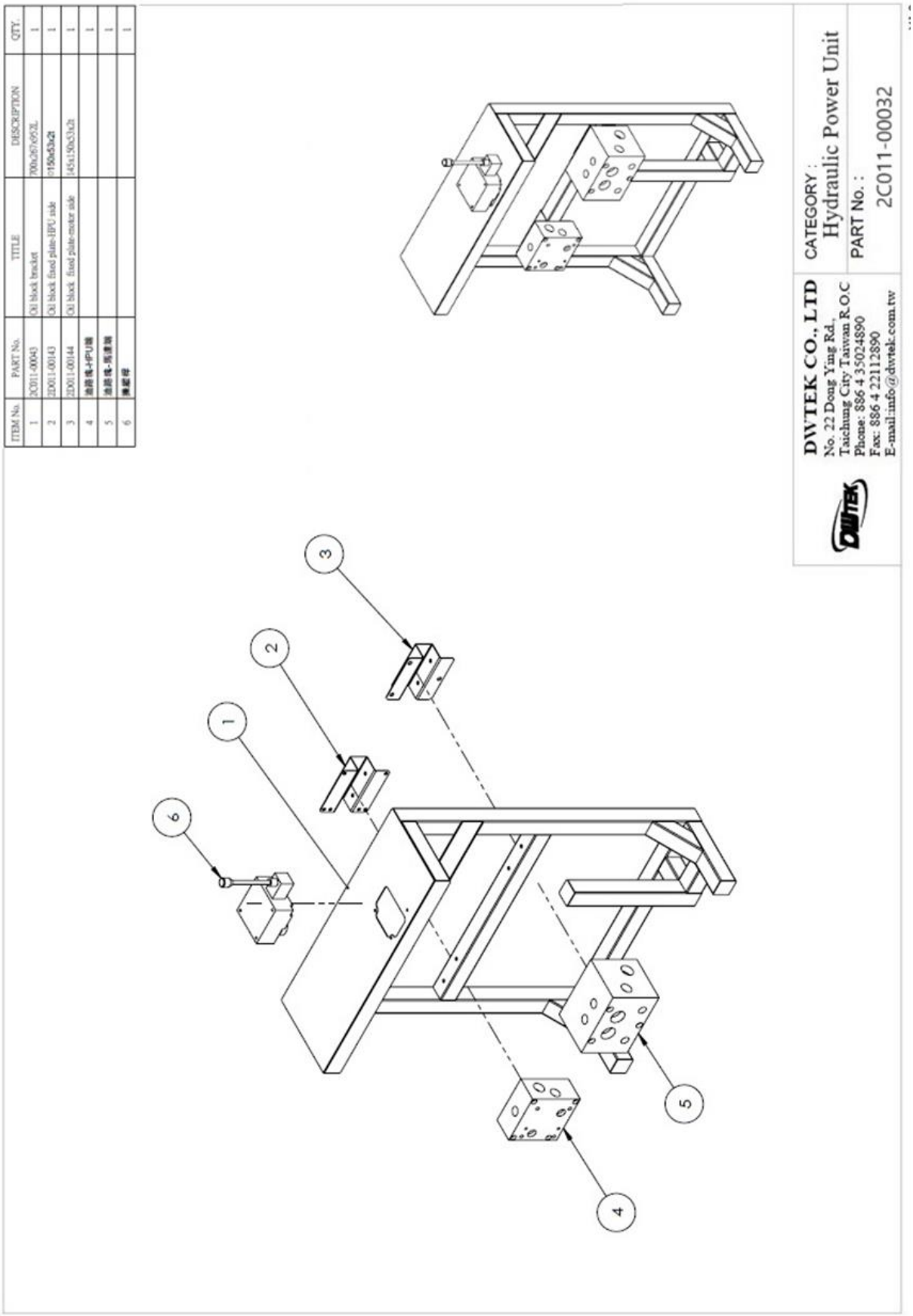

Figure 12 – Hydraulic Power Unit (2C011-00032)

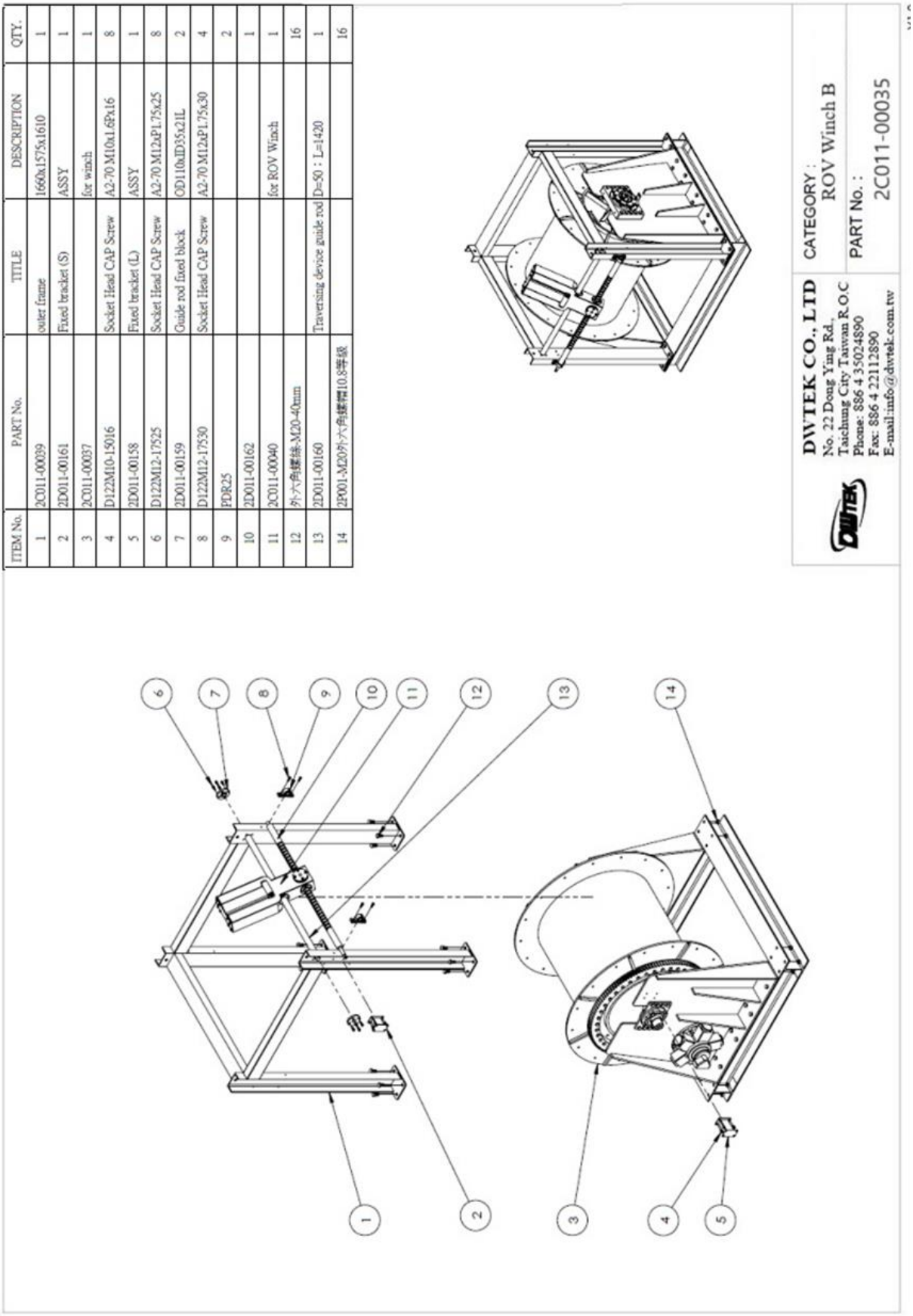

Figure 13 – ROV Winch B (2C011-00035)

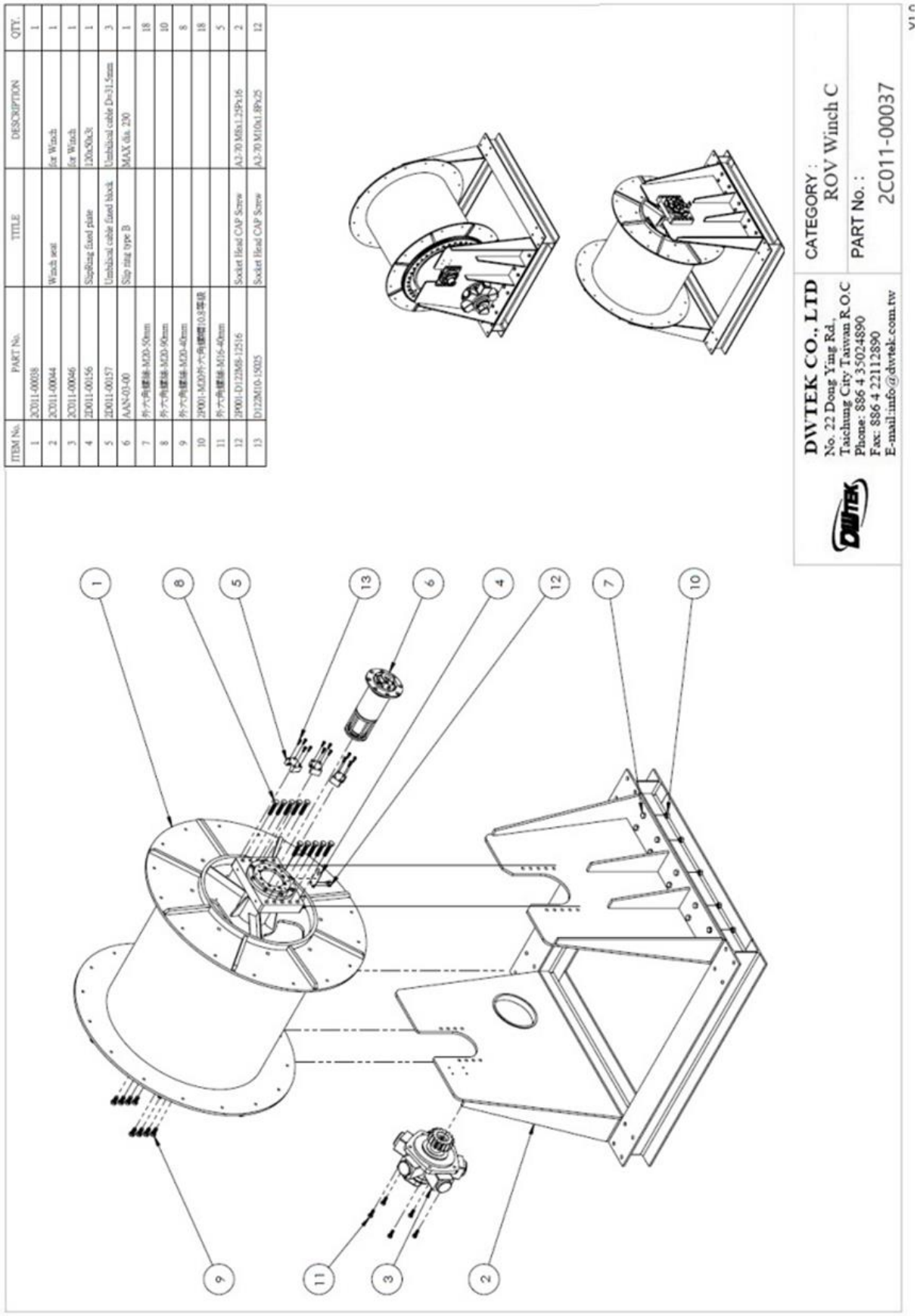

Figure 14 – ROV Winch C (2C011-00037)

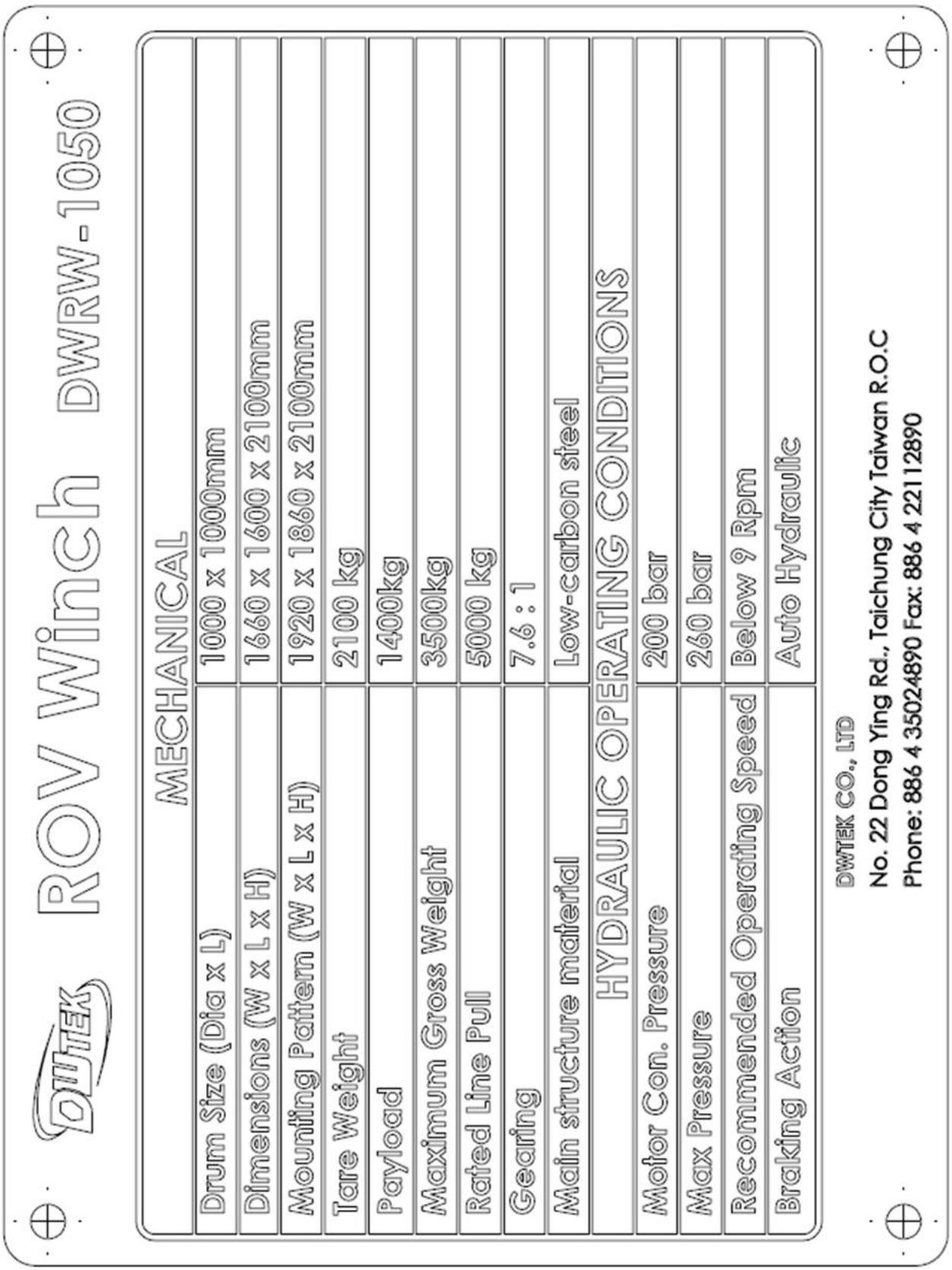

Figure 15 –DWRW-1050 Nameplate

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