



**YH YoohanENS**

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*Value No1.  
Solution Provider*



YH ENS tries to challenge continuously to become the company to grow with customers together.  
We will be the best business partner with trust and expectation based on People, technique and value as our core value. We will provide a differentiated service with accumulated technology and know-how as your business partner for happy value creation.



## R&D With creativity and passion, YH ENS R&D tries to challenge for improving professional competency.

- Develop planetary reducer for shipbuilding, construction equipment and wind power generators
- Provide 3D solution as required specification
- Analyze the design verification and optimized design

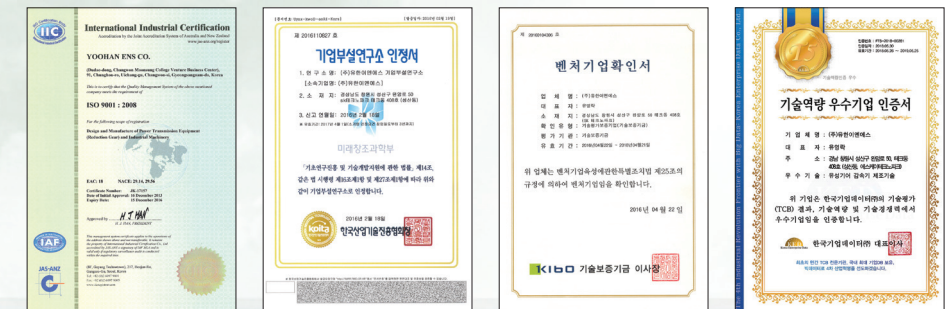
### ▶ R&D development area

#### Reducer

- Reducer with the teeth of cycloid
- Minimized and lightened planetary reducer with high efficiency
- Planetary reducer to be adaptable on high torque
- Satisfy with various specification for shipbuilding and wind power
- Many patent about planetary reducer and hydraulic brake

#### Design automation

- Gear teeth and parametric 3D modeling
  - Gear strength analysis
  - Drawings and Kinematic simulation
- Template and Automation
  - Assembly template
  - Part template



It establishes trust in customers with continuous passion and new value creation.

-People : Future management with person

-Technique : New technology through continuous human resource cultivation

-Value : Social value realization with person and technique



# Planetary Gear Reducer

## ► Construction Equipment

### ■ Application

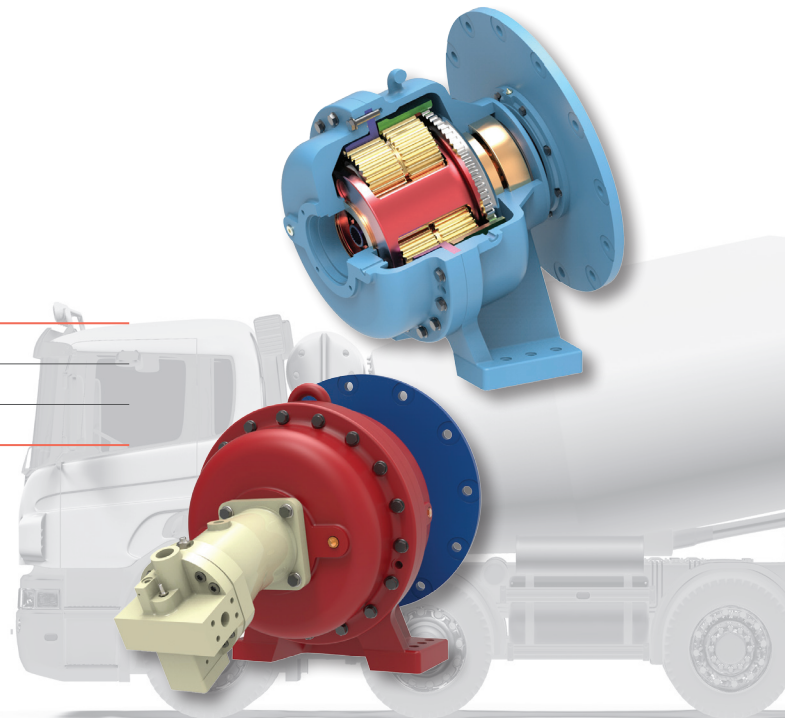
- Drum reducer module of mixer truck
- Drive reducer module of wheel hub
- Drive reducer module of driving

### ■ Specification

Gear Ratio	1/13~1/350
Stages	1,2,3,4
Break	Lining type, Disc type

### ■ Features

- High reducing ratio in minimizing and weight-lightening
- Outstanding endurance from shock and vibration
- Various oil brake system application(Lining type, Disc type)



## ► Shipbuilding & Marine

### ■ Application

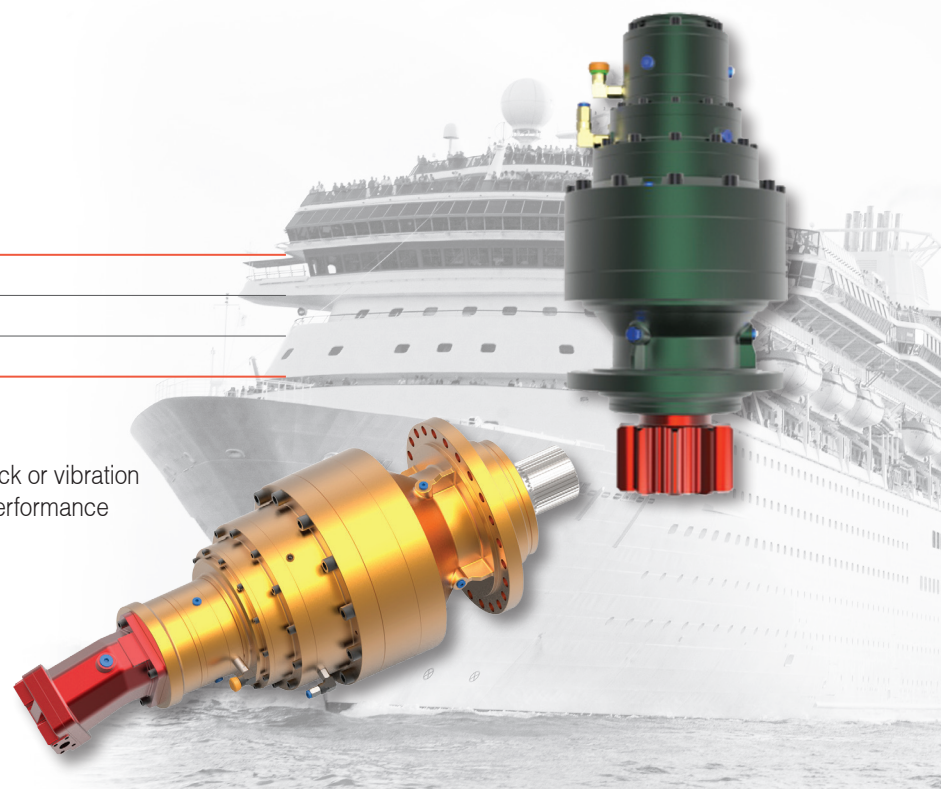
- Slewing reducer, Hoist reducer
- Reducer for winch

### ■ Specification

Gear Ratio	1/12~1/350
Stages	2,3,4
Break	Lining type

### ■ Features

- Planetary reducer against high torque of shock or vibration
- Excellent endurance with good lubrication performance
- Adjustable torque of hydraulic brake



# Special equipment

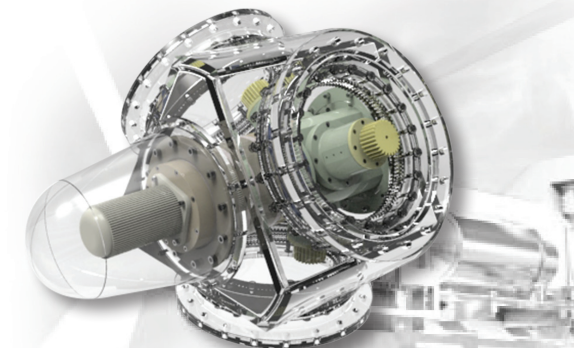
## ► Wind Turbines

### ■ Application

- Pitch drive reducer
- Yaw drive reducer

### ■ Features

- Planetary reducer with low noise and high endurance
- Make-to-order as required specification
- Reducer for special application



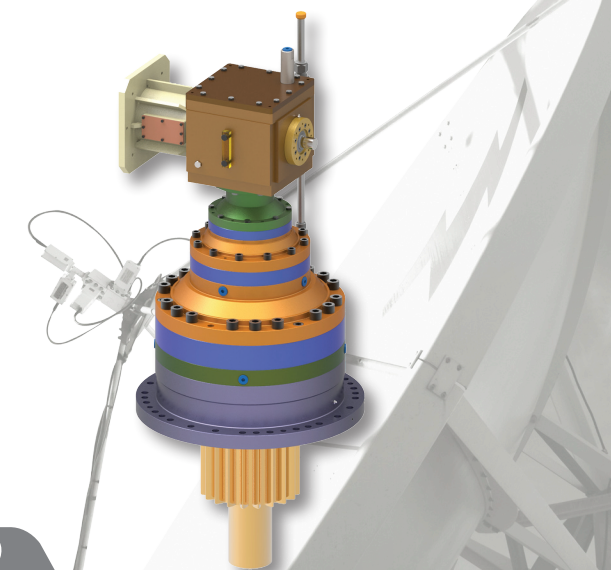
## ► Radio Telescope

### ■ Application

- Azimuth Speed Reducer
- Elevation Speed Reducer

### ■ Features

- Outstanding endurance from shock and vibration
- Make-to-order as required specification
- Special specification for radio telescope



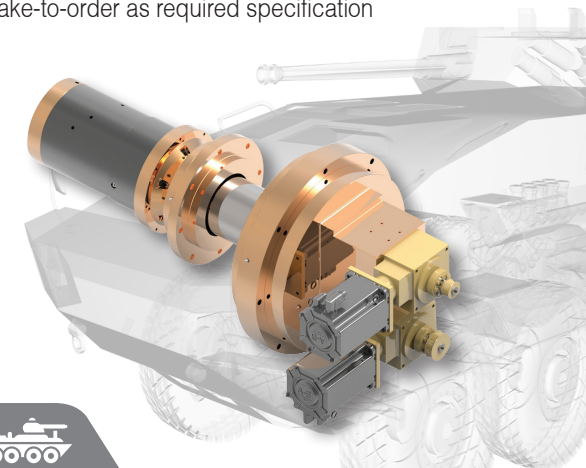
## ► Defense

### ■ Application

- Reducer / Increaser for equipment

### ■ Features

- Planetary reducer against high torque of shock of vibration
- Various specification and system
- Make-to-order as required specification



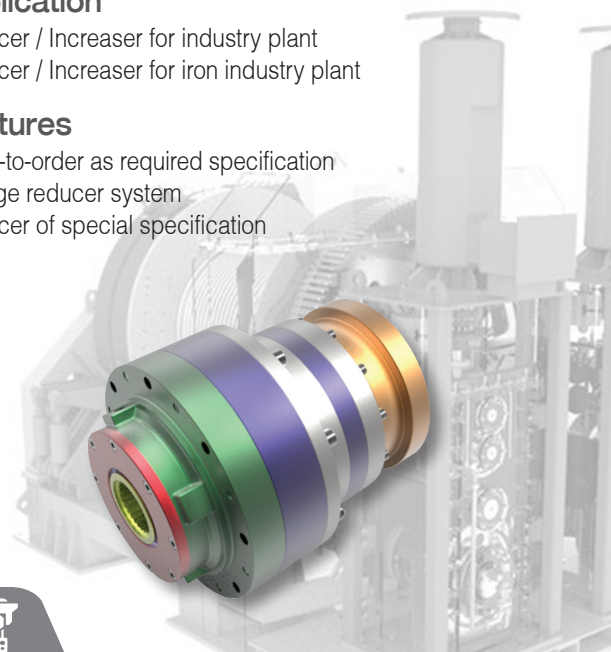
## ► Industrial Machines

### ■ Application

- Reducer / Increaser for industry plant
- Reducer / Increaser for iron industry plant

### ■ Features

- Make-to-order as required specification
- 2-stage reducer system
- Reducer of special specification



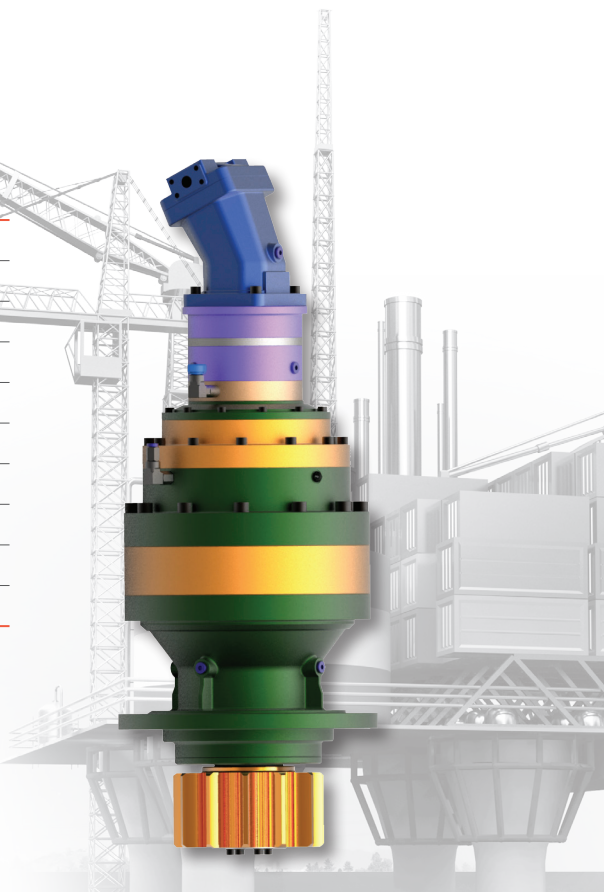
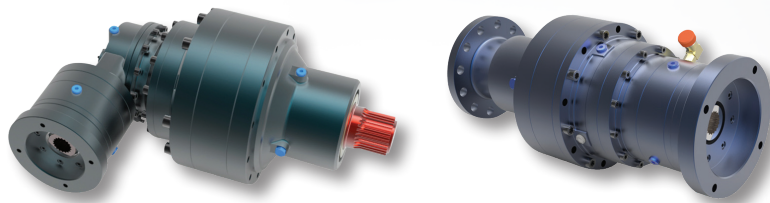


## ► Slewing and Hoist Reducer

### Specification

Make-to-order as required specification.

Torque(dyn) [N.m]	16,000 / 24,000 / 36,000
Torque(max) [N.m]	26,000 / 37,000 / 63,600
Stages	2,3,4
Ratio	1/12~1/1200
Hydraulic Motor	Spec is according to requirment of order
Weight without motor (approx.) [kg]	ab.190 / ab. 290 / ab.470
Output speed [rpm]	5~20
Hydraulic Braking torque [N.m]	350~900
Hydraulic Brake releasing pressure [bar]	15~35
Hydraulic Brake max pressure [bar]	315

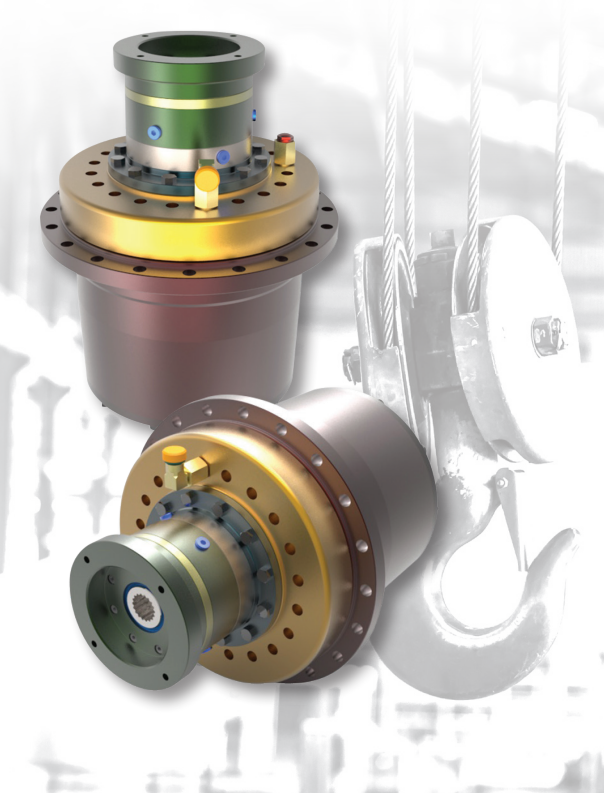


## ► Drive Reducer

Torque(dyn) [N.m]	12,800 / 18,500
Torque(max) [N.m]	25,000 / 36,000
Stages	2,3,4
Ratio	1/12~1/600
Hydraulic Motor	according to requirment of order
Weight without motor (approx.) [kg]	ab.200 / ab. 240
Output speed [rpm]	20
Hydraulic Braking torque [N.m]	350~900
Reverse rotation prevention with one-way bearing	T=1,050 [N.m]
Hydraulic Brake releasing pressure [bar]	15~35
Hydraulic Brake max pressure [bar]	315

### ■ Features

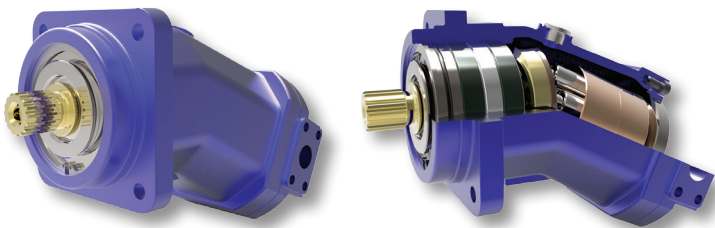
- Hydraulic brake : reverse rotation prevention system
- High reduction gear ratio in miniaturization and weight-lightening
- Specially guaranteed durability on impact and vibration
- Make-to-order as required specification
- Oil brake system : Lining type, Disc type.
- Adjustable torque of hydraulic brake with anti-backlash



## ► Hydraulic Axial Piston Motor

### ■ Application

- Marine ship-building and off-shore equipments
- Construction equipments
- Industrial equipments
- Conveyance(lifting, hoist) equipments
- Agricultural machine equipments
- Mining equipments
- Airport and Railway equipments



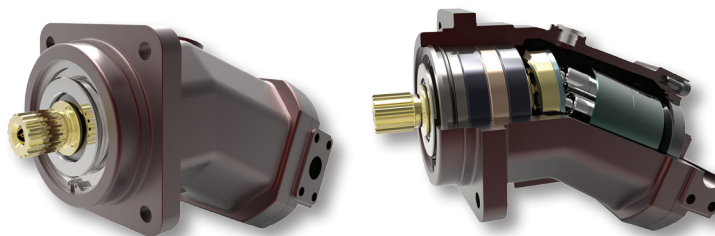
### ■ Specification

Motor Size	55cc	80cc	107cc
Displacement [cm³/rev]	54.6	80.3	106.6
Working pressure [bar]	250	250	250
Max. pressure [bar]	350	350	350
Max. speed [rpm]	3,900	3,450	3,000
Max. flow [l/m]	211	276	320
Max. torque [N.m]	303	447	593
Weight [kg]	21.0	28.8	40.5
Max. power [kw]	121	158	183
Connection port	A:SAE 3/4" (6,000 psi)	A:SAE 1" (6,000 psi)	A:SAE 1 1/4" (6,000 psi)
	B:SAE 3/4" (6,000 psi)	B:SAE 1" (6,000 psi)	B:SAE 1 1/4" (6,000 psi)

## ► Hydraulic Axial Piston Pump

### ■ Application

- Marine ship-building and off-shore equipments
- Construction equipments
- Industrial equipments
- Conveyance(lifting, hoist) equipments
- Agricultural machine equipments
- Mining equipments
- Airport and Railway equipments



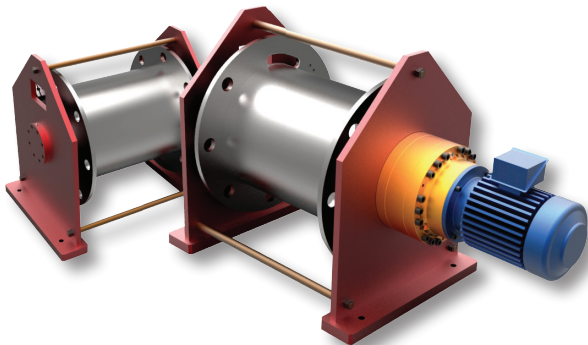
### ■ Specification

Pump Size	55cc	80cc	107cc
Displacement [cm³/rev]	54.6	80.3	106.6
Working pressure [bar]	250	250	250
Max. pressure [bar]	350	350	350
Max. speed [rpm]	2,000	1,800	1,600
Max. flow [l/m]	108	143	169
Max. torque [N.m]	303	447	593
Weight [kg]	21.0	28.8	40.5
Max power [kw]	62	82	97
Connection port	S:SAE 1" (3,000 psi)	S:SAE 1 1/4" (3,000 psi)	S:SAE 1 1/2" (3,000 psi)
	A(B):SAE 3/4" (6,000 psi)	A(B):SAE 1" (6,000 psi)	A(B):SAE 1 1/4" (6,000 psi)



## ► Electrical Winch

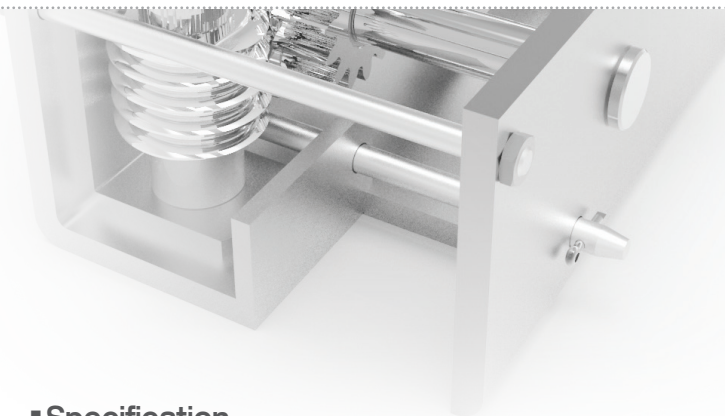
Ratio	1/20~1/140
Capacity [ton]	2~10 (4,409~22,046 lb)
Output speed [rpm]	20~40
Electrical Braking torque [N.m]	80~500



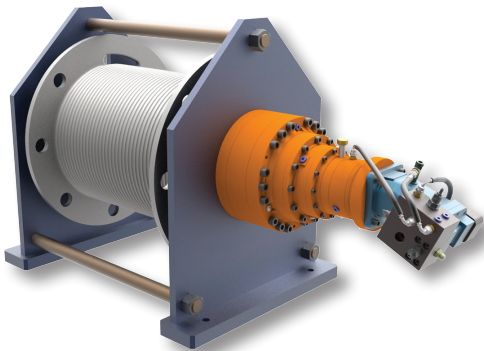
## ► Hydraulic Winch

### ■ Application

- Mooring arrangements
- Cargo gear arrangement for marine shipbuilding
- Construction equipment
- Distribution industry



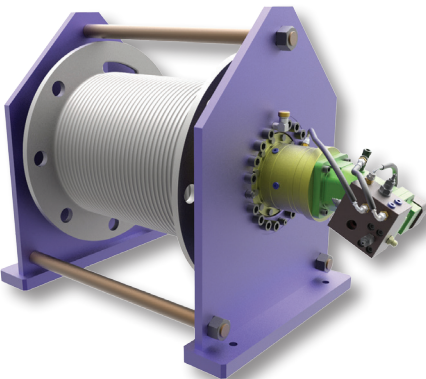
### » Horizontal Winch



### ■ Specification

Ratio	1/3~1/350
Capacity [ton]	2~20 (4,409~44,092 lb)
Working pressure [bar]	200~250
Output speed [rpm]	20~40
Hydraulic Braking torque [N.m]	350~900
Hydraulic Brake releasing pressure [bar]	15~35
Hydraulic Brake max pressure [bar]	315
Reverse rotation prevention with one way bearing (option)	T=1,050 [N.m]

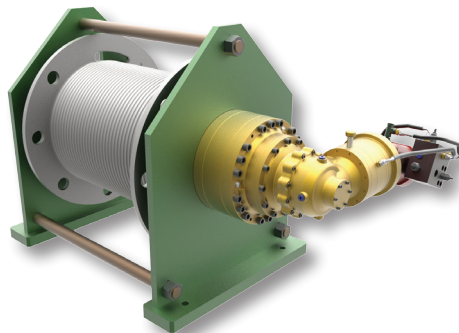
### » Drive Winch



### ■ Specification

Ratio	1/20~1/140
Capacity [ton]	2~20 (4,409~44,092 lb)
Working pressure [bar]	200~250
Output speed [rpm]	20~40
Hydraulic Braking torque [N.m]	350~900
Hydraulic Brake releasing pressure [bar]	15~35
Hydraulic Brake max pressure [bar]	315
Reverse rotation prevention with one way bearing (option)	T=1,050 [N.m]

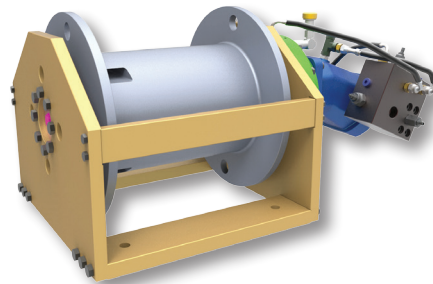
## » Right-Angle Winch



### ■ Specification

Ratio	1/20~1/140
Capacity [ton]	2~20 (4,409~44,092 lb)
Working pressure [bar]	200~250
Output speed [rpm]	20~40
Hydraulic Braking torque [N.m]	350~900
Hydraulic Brake releasing pressure [bar]	15~35
Hydraulic Brake max pressure [bar]	315
Reverse rotation prevention with one way bearing (option)	T=1,050 [N.m]

## » Hoisting Winch



### ■ Specification

Ratio	1/20~1/140
Capacity [ton]	2~10 (4,409~22,046 lb)
Working pressure [bar]	200~250
Output speed [rpm]	20~40
Hydraulic Braking torque [N.m]	200~500
Hydraulic Brake releasing pressure [bar]	15~35
Hydraulic Brake max pressure [bar]	315
Reverse rotation prevention with one way bearing (option)	T=570 [N.m]

Possible for make-to-order according to customer's specification(special-purpose or specific design)  
Supply brake valve block | Hydraulic Motor(Standard:50cc/80cc/107cc or other specification) | stages : 1,2,3 or 2,3

## ► Manual Hnad Winch

### ■ Application

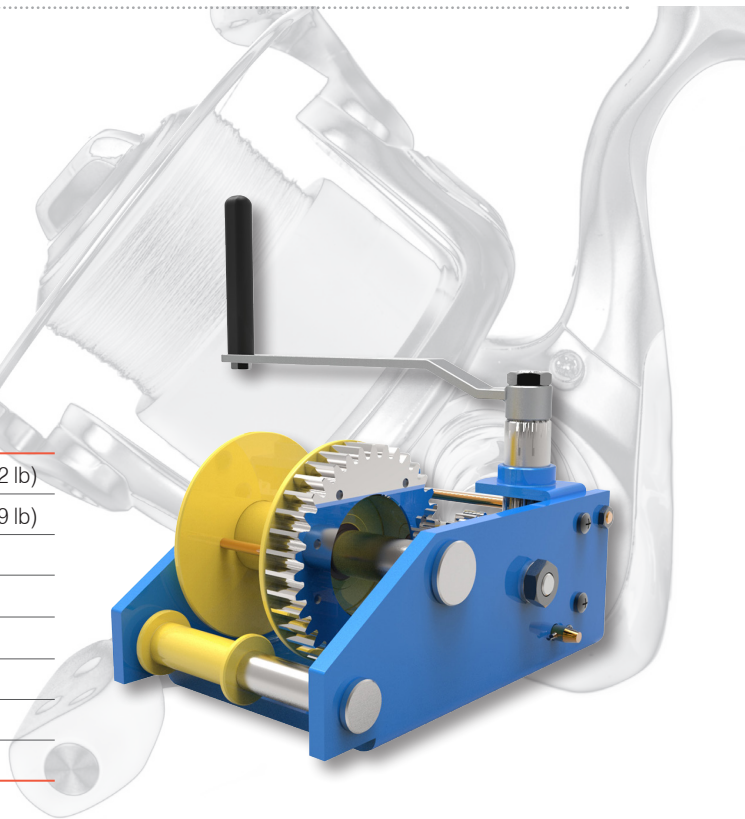
- Vehicle, Shipbuilding
- Construction, Industrial machines

### ■ Features

- Reverse rotation prevention type (Worm gear)
- Ease of installation and portableness
- High capacity with efficient reduction gear ratio

### ■ Specification

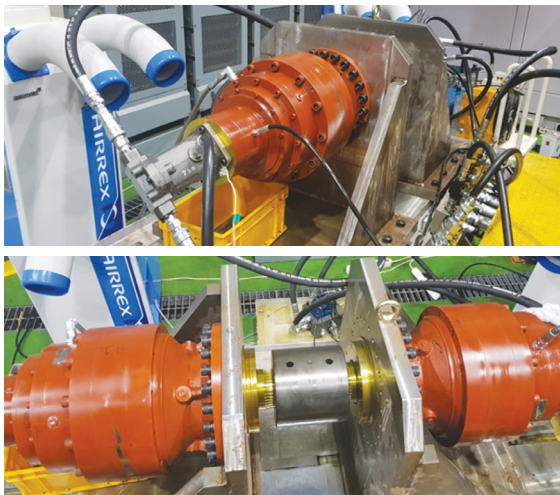
Max.Load Tension [kgf]	3,000 (=6,600 lb)	2,500 (=5,512 lb)
Working Load Tension	2,500 (=5,512 lb)	2,000 (=4,409 lb)
Weight [kg]	23	21
Drum Diameter [mm]	ø 48,6	ø 65
Drum Width [mm]	86	80
Handle Operation Power [kg]	ab.14	ab.12
Handle Length [mm]	350	
Gear Ratio	1/61.7	



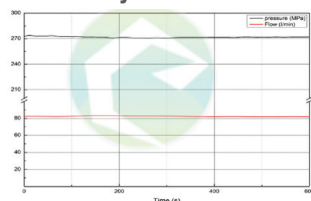


# Development status

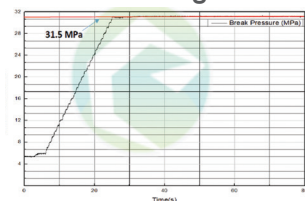
## ► Planetary Gear Reducer



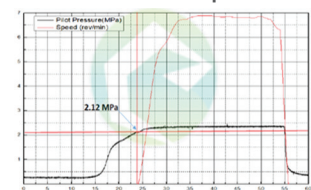
■ Durability test



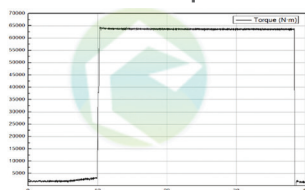
■ H-brake leakage flow



■ H-brake release pressure



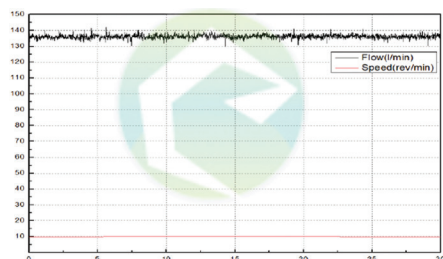
■ Maximum torque



■ Test condition

Product	Item	Target
Planetary Gear Reducer	Max.torque	63,600 N.m
	Brake release pressue	(2.5±0.5) Mpa
	Reducer ratio	1 / (247±0.5)
	Max. brake pressure	31.5 Mpa
	Brake torque	700 N.m

■ Reduction ratio



## ► Planetary Gear Reducer with hydraulic brake

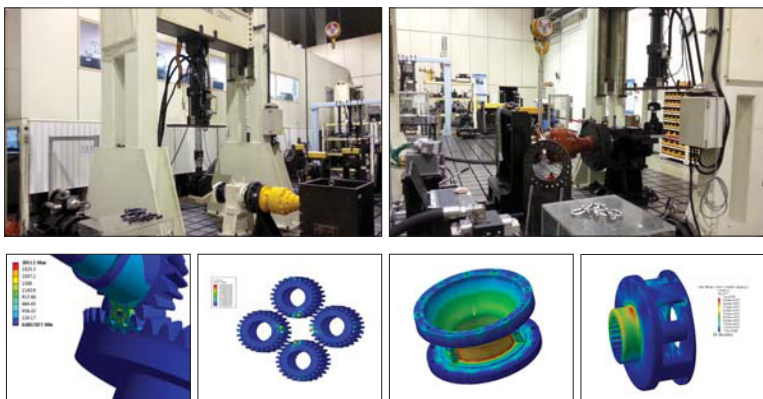
■ Test condition

Product	Item	Target	Notes
Reducer for shipbuilding	Opening pressure of oil brake	40±5 bar	Horizontal length of jig to work on rotary system : 0.8m
	Leakage	0 cc	
	Max. pressure of oil brake	300over bar	
	Torque of oil brake	650over N.m	
	Max. torque	60,000over N.m	



• Opening pressure of hydraulic pressure

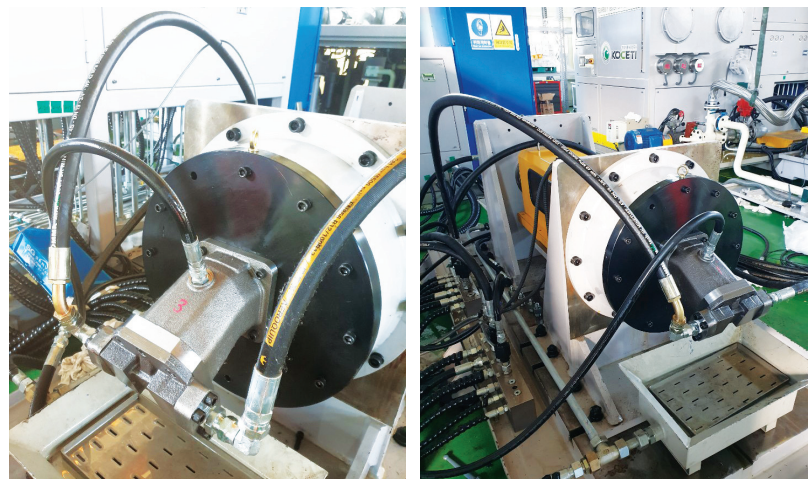
Test product	Test picture
SPL#1	
SPL#2	
No issue with (40±5) bar	



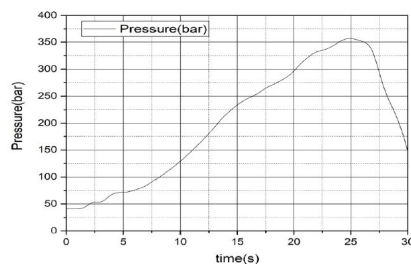
# Development status

## ► Hydraulic Axial Piston Motor/Pump

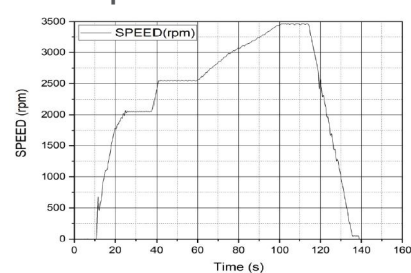
■ Test result



■ Max.pressure test



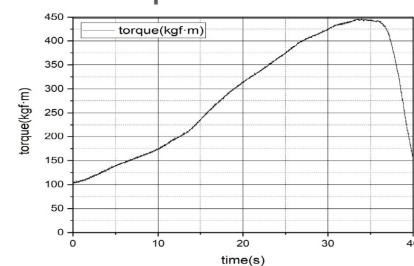
■ Max.rpm test



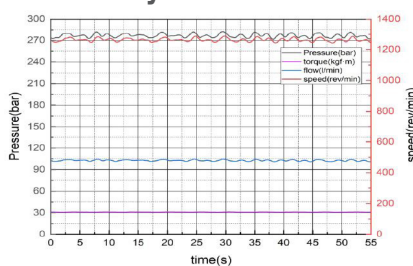
■ Test condition

Product	Item	Target
Hydraulic Axial Piston Motor	Displacement	80 cc/rev
	Max.torque	447 N.m
	Max.pressure	350 bar
	Max.RPM	3,450 rev/min
	Volumetric efficiency	97%
	Mechanical effeciency	92%

■ Max.torque test



■ Efficiency test



■ Displacement test

