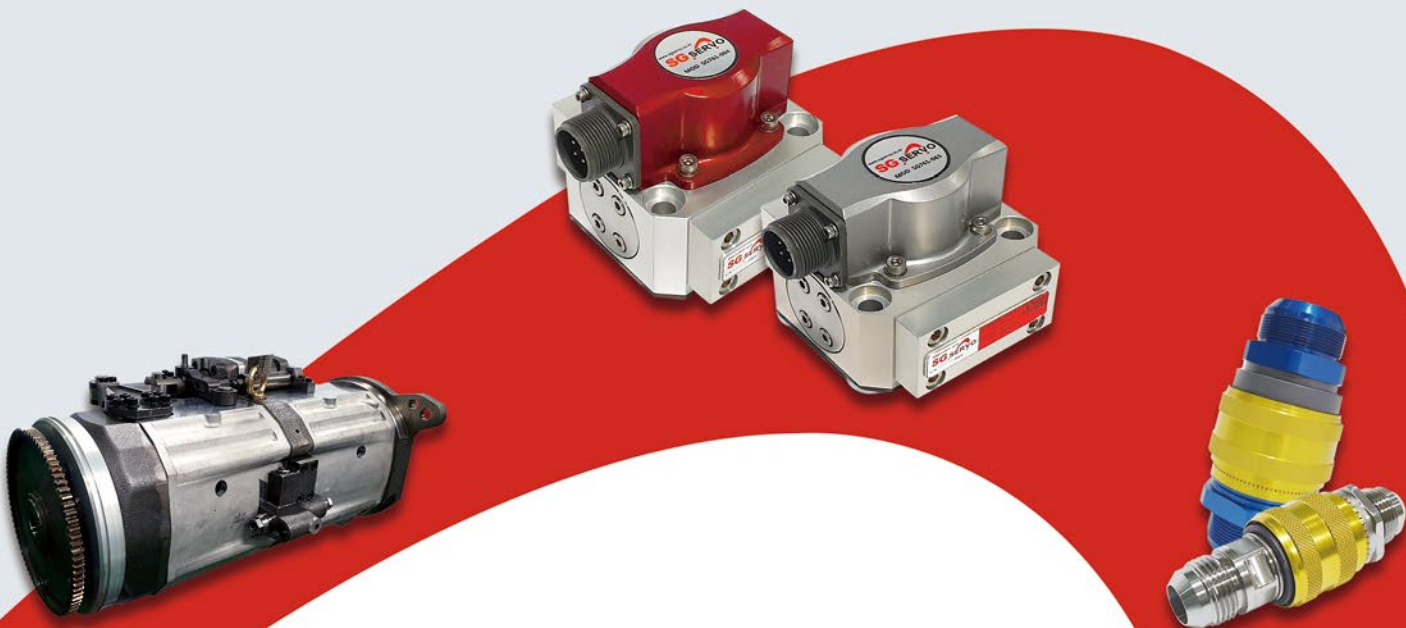


# SG SERVO

Specialized in Hydropneumatic  
and Electric Drive Products



**THE MOST COMPETITIVE COMPANY**

In Motion Control System

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# CEO Greetings



## Innovation of Motion Control

### We are SG SERVO, the Leader in Motion Control!

Hello. We are Go-Do Kim and Hyen-Cheol Lee, the co-representatives of SG SERVO.

Since our founding in 2002, we have grown into a company specialized in the R&D and production of precision hydropneumatic and electric drive products. All employees are committed to making the company that grows together with customers and trusted by customers under the company motto of "Faith and Mutual Growth".

Through continuous R&D investment, we will strive to become the best 'small giants' company that can provide total solutions for motion control systems, and we will endeavor to become a so good(SG) company that fulfills its social responsibility.

We kindly ask for your continued interest and support.  
Thank you.



## Company Overview

Company Name	SG SERVO Co., Ltd.	Establishment	2002.01.19. (2017.04.04. Spin off)
CEO	Kim Go-Do Lee Hyen-Cheol	Address	17, Pyeongsan-ro 8beon-gil, Uichang-gu, Changwon-si, Gyeongsangnam-do, Republic of Korea
Website	www.sgserve.co.kr	E-Mail	buiz@sgserve.co.kr



### SG

It is an abbreviation of 'So Good' intending to make the best products which satisfy customers with performances and qualities.

### SERVO

It symbolizes the goal of becoming the world's best 'servo technology company'

### Red oval

It expresses a fiery passion and vividness flapping with progressive spirit





## 2006~2011

- Obtained INNO-BIZ certifications **2006. 01**
- Selected as a military service exception company by the Military Manpower Administration **2007. 12**
- Received the Commissioner of Korean Intellectual Property Office Award **2010. 04**
- Received the Minister of Ministry of SMEs and Startups Award **2011. 03**

## 2013

- Obtained AS 9100 certifications **02**
- Received the Superintendent of Changwon Tax Office Commendation **03**
- Selected as an Advanced Technology Center(ATC) by Ministry of Trade, Industry and Energy **06**
- Selected as a company that wants to work by the INNO-BIZ Association **09**



## 2015

- Received the Best R&D Team Award by Changwon City **12**

## 2018

- Received the Minister of National Defense Commendation **05**

## 2023

- Factory Expansion Relocation **11**

## 2002~2003

- 2002. 01** Established SG SERVO Co., Ltd.
- 2003. 05** Established R&D Center
- 2003. 09** Obtained ISO 9001 certifications



## 2012

- 09** Selected as an excellent job-creating company by Changwon City
- 12** Obtained ISO 14001 certifications



## 2014

- 04** Received the Minister of Ministry of Trade, Industry and Energy Commendation
- 07** Selected as a company that wants to work by the Gyeongnam Regional SMEs and Startups office

## 2016

- 07** Obtained Defense Quality Management System (DQMS) certification



## 2022

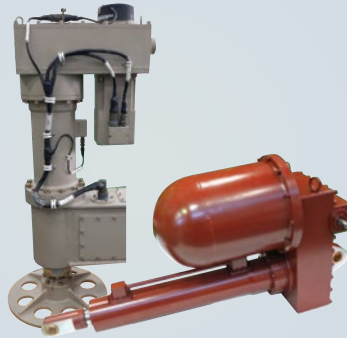
- 03** Obtained MAIN-BIZ certifications

# Business Fields



## Servo Hydraulic

- Servo Valves
- Proportional Valve
- Servo Actuator
- Spools / Sleeves



## Electric Driving

- Actuator
- Reducer



## General Hydraulic & Pneumatic

- Valves
- Pump / Motor
- Power Pack
- Quick Disconnect Coupling

## Key Clients



?

We will happily invite you as our next client.

# Main Products

- 08** Servo Hydraulic
  - 08** Servo / Proportional Valve
  - 08** Servo Actuator
  - 08** Spools / Sleeves
- 09** Electric Drive
  - 09** Actuator
- 10** General Hydraulic & Pneumatic
  - 10** Valves
  - 11** Pump / Motor
  - 11** Cylinder
  - 12** Power Pack
  - 12** Other Hydropneumatic Product

# Servo Hydraulic

SG SERVO designs and manufactures servo valve, proportional valve, servo actuator of which speed/force/direction can be precisely controlled according to user's demand. Also SG SERVO designs servo systems using these equipments.

## Servo / Proportional Valve



### Servo Valves

Max. Operating Pressure	350 bar
Rated Flow	4, 19, 38, 63 lpm

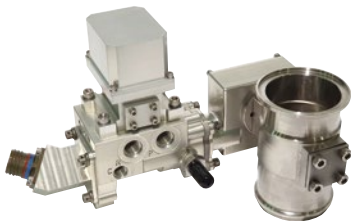
\* 2 stage, Nozzle flapper type servo valves (4 kinds)

### Proportional Valve

Max. Operating Pressure	350 bar
Rated Flow	32 lpm

## Servo Actuator

Patent



Stroke	25~2,000 mm	Operating Pressure	35~315 bar	Force	280~3,500 kg
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## Spools / Sleeves



Operating Pressure	70~350 bar	Rated Flow	25~756 lpm (@70 bar)
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\* Spools / Sleeves for servo valves (13 kinds)



# Electric Drive

SG SERVO designs and manufactures linear electric actuator, reducer for precise motion control.

## Actuator



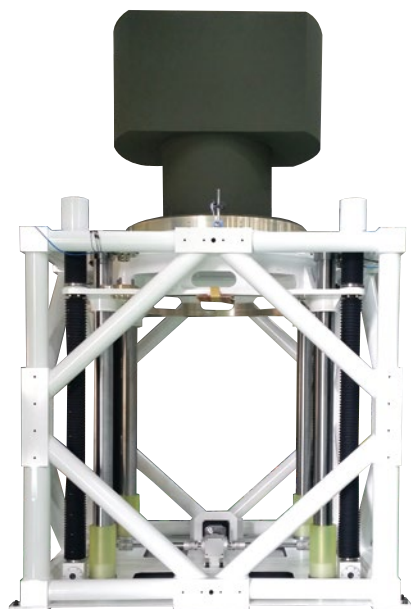
### Actuators (3 items)

Reduction Ratio	5:1, 15:1	Driving Speed	7.5~20 mm/sec
Stroke	450 mm	Max. Force	10~20 kN



### Reducer

Reduction Ratio	19.3:1	Output Torque	4,700 Nm
Max. Input Speed	1,500 rpm	Efficiency	97% ▲



### Lift Assembly / Gimbal Assembly

Reduction Ratio	6:1	Driving Speed	138 mm/sec
Stroke	1,300 mm	Max. Force	11 kN



### Auto Leveling System

Reduction Ratio	15:1	Driving Speed	9 mm/sec
Stroke	450 mm	Max. Force	52 kN

# General Hydraulic & Pneumatic

## Valves



**Module Valve Assembly**

Max. Operating Pressure	320 bar
Max. Flow Rate	40 lpm



**Valve Sensor Assembly**

Max. Operating Pressure (Pneumatic Pressure)	1.3 bar
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**Manifold / Wheel Valve Assembly**

Max. Operating Pressure	9.5 bar
Working Fluid	Dry air (moisture content < 0.5%)



**Solenoid Valve**

Max. Operating Pressure (Pneumatic Pressure)	50 bar
Supply Voltage	28 VDC



**Manifold Assembly (Track tension control)**

Proof Pressure (Input Port)	294 bar	Rated Flow	7 lpm
Proof Pressure (Output Port)	441 bar	Accumulator Tank Capacity	200 cc



**Manifold Assembly (Dozer Control)**

Proof Pressure	343 bar
Rated Flow	15 lpm



SG SERVO manufactures general hydraulic pneumatic products such as valve, pump, manifold, quick disconnect coupling, hydraulic power supply & distribution device and has a technology to design hydraulic systems.

## Pump / Motor



### Hydrostatic Steering Unit

Max. Input Power	432 kW (@2,300 rpm)
Max. Operating Pressure	530 bar
Max. Input Speed (Instantaneous / Continuous)	2,600 rpm / 2,300 rpm
Displacement	250 cc/rev



### Piston Pump Patent

Rated Pressure	350 bar
Displacement	110 cc/rev
Feature	Variable Displacement, with Load Sensing Controller



### External Gear Pump

Rated Flow	294 lpm
Driving Torque	67 Nm

## Cylinder



### Cylinder

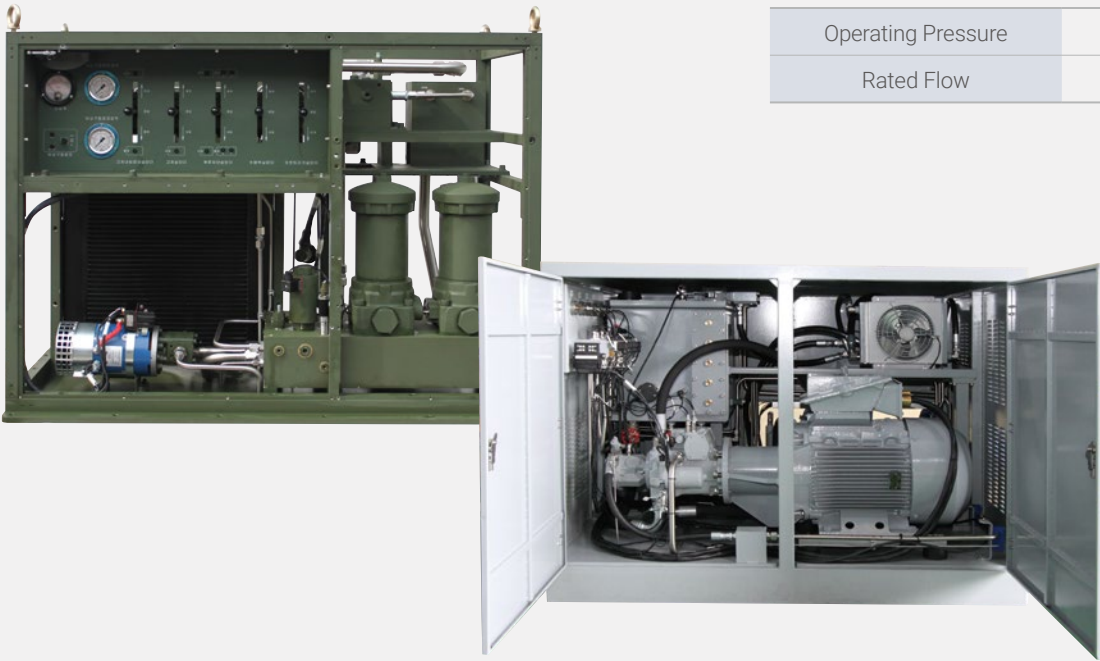
Loading Force	220 kg
Stroke	196 mm
Feature	Built-in anti-sag pilot check valve



### Steering Cylinder

Stroke	±159 mm (Articulation)
	±13 mm (Bogie)
Feature	Built-in LVDT

Power Pack



Hydraulic Power Supply / Distribution Device

Operating Pressure	185~280 bar
Rated Flow	200, 230 lpm

Other Hydropneumatic Products



Quick Disconnect Coupling **Patent**

Operating Pressure	600 ~ 3,000 psi
Pressure Drop	3 ~ 8 psi
Tube Size	0.25 ~ 2 inch

\* For aircraft hydraulic, Self sealing, ratchet lock (5 kinds)



Damper

Stroke	25 mm
Damping Force	2,170 kg (@0.25 m/sec)



Damper

\* The time required to compress 50mm with a force of 3,300kg is between 1~2 seconds.

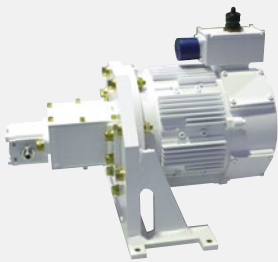
# Applications

- 14** K21 Recovery Vehicle
- 16** K55 Self Propelled Howitzer
- 17** K200 Infantry Fighting Vehicle
- 17** K808 Infantry Combat Vehicle
- 18** Submarine
- 20** Aviation
- 22** Magnetic Levitation Train

# K21 Recovery Vehicle

## Design and Production of Hydraulic System

Manifold Assemblies and Driving Units	16 items
Pumps and Valves for Transmission	5 items



**Driving Unit**  
for emergency power generation



**Manifold Assy.**  
for emergency power control



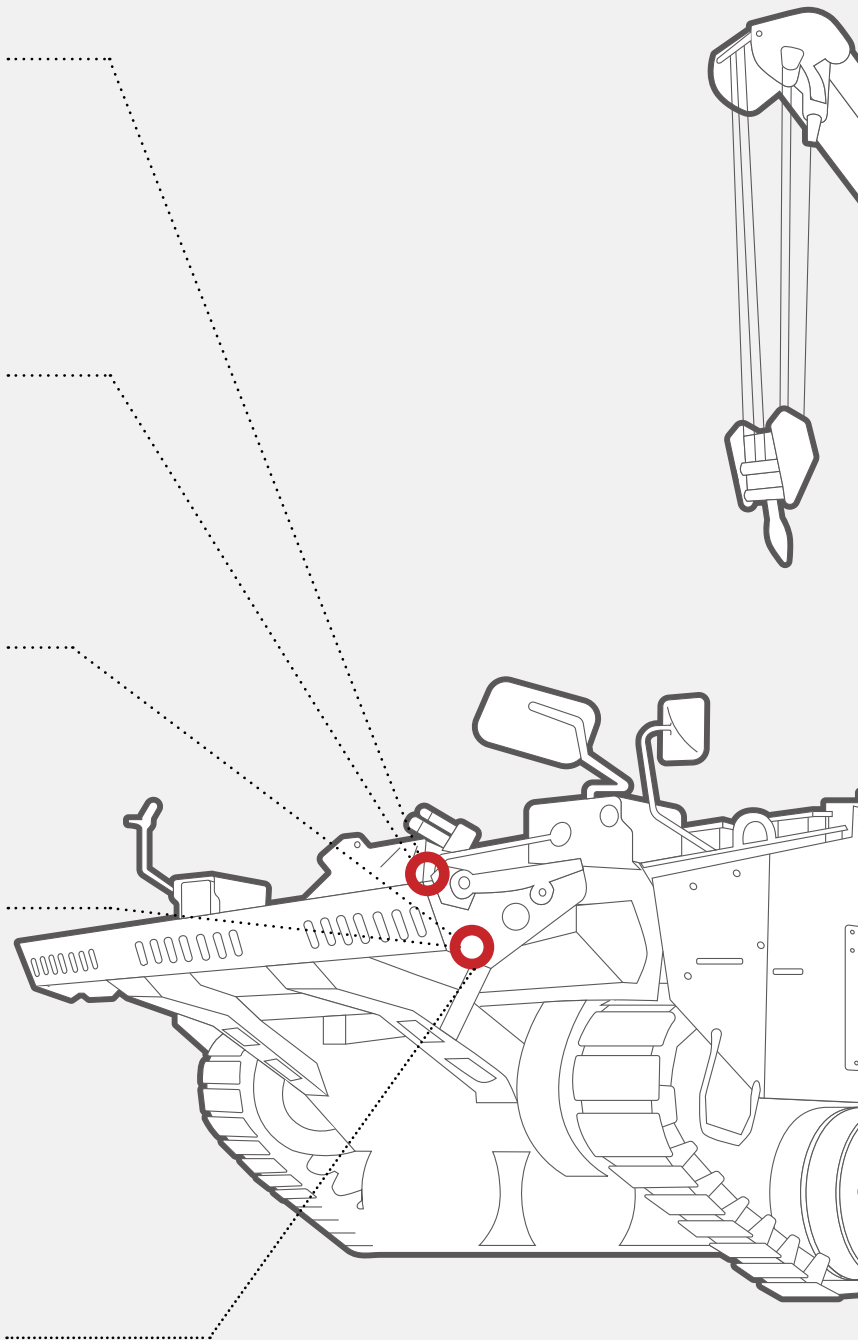
**Manifold Assy.**  
for clutch control



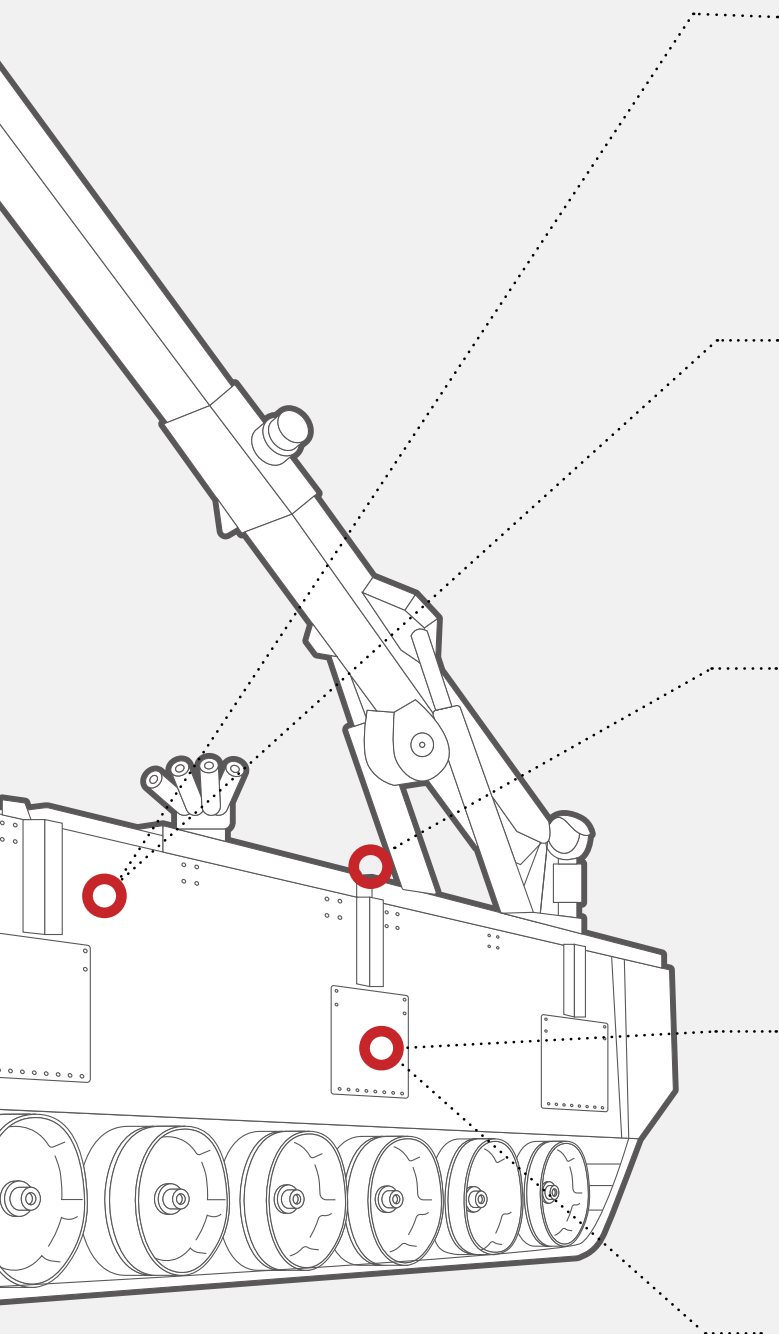
**Driving Unit**  
for power take off



**Reservoir**



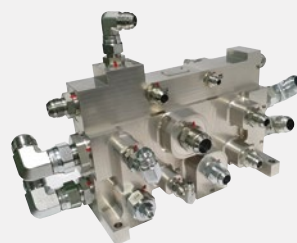
You can check working line diagram by scanning the QR code with your smartphone.



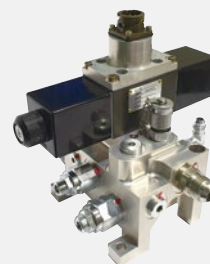
**Manifold Assy.**  
for track tension control



**Manifold Assy.**  
for hydraulic pressure distribution



**Manifold Assy.**  
for cooling fan control



**Valve Sensor Assy.**  
for flotation device control



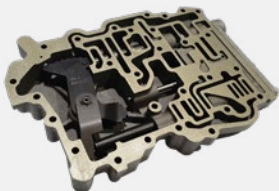
**Manifold Assy.**  
for added armor control





# K55 Self Propelled Howitzer

7 items for transmission (Model Type XTG 411-2A)



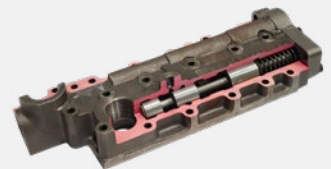
**Control Valve**  
for gear range control



**Relay Valve**  
for supply of hydraulic  
fluid according to gear  
shifting condition



**Steering Valve**  
for controlling of steering  
pressure



**Main Control Valve**  
for maintaining main  
hydraulic pressure



**External Gear Pump**  
for circulation of  
cooling oil



**External Gear Pump**  
for circulation of  
hydraulic oil



**Pump Assembly**  
for supply of valve's main  
pressure

# K200 Infantry Fighting Vehicle

2 items for transmission (Model Type X200-5K)



**External Gear Pump**  
for oil input

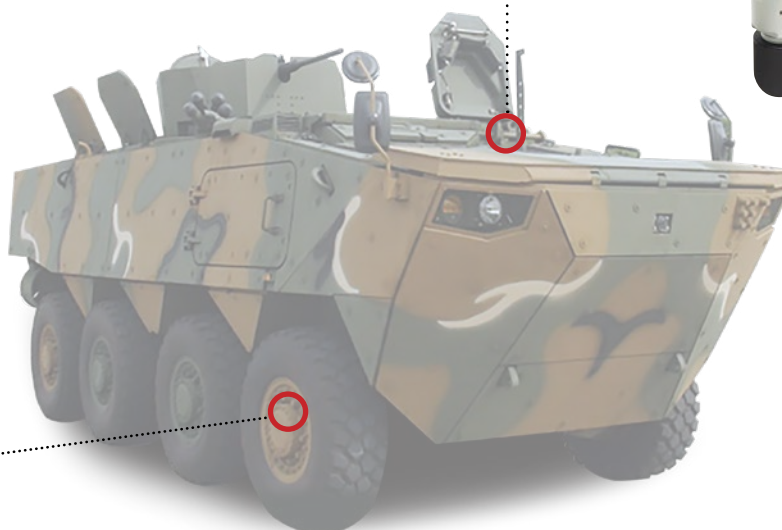


**External Gear Pump**  
for oil output

# K808 Infantry Combat Vehicle

Manifold / wheel valve Assy. for CTIS

\* Central Tire Inflation System



**Manifold**



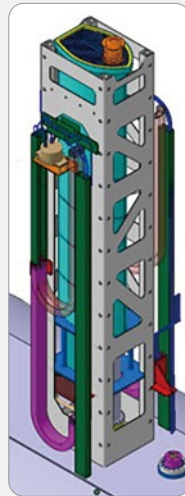
**Wheel Valve**



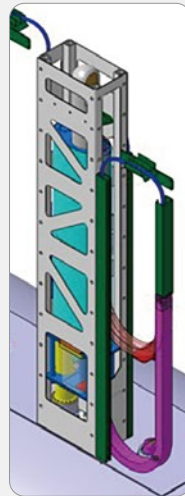
# Submarine

## Mast Raising Equipment

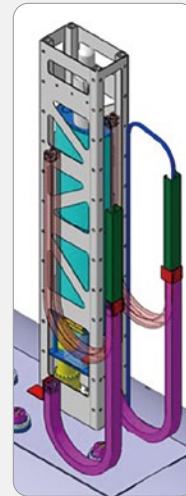
Driving Type	Electric Driving
Input Power	5~7 kW
Max. Speed	300 mm/sec
Stroke	2,400~3,600 mm



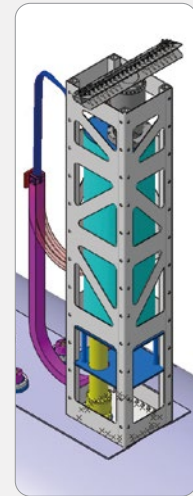
Snorkel Mast



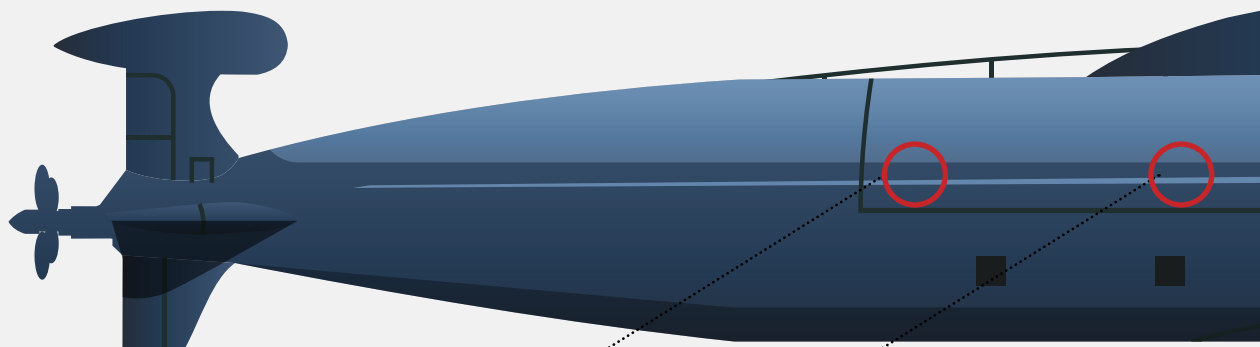
Attack Optronic  
Head Mast



Search Optronic  
Head Mast

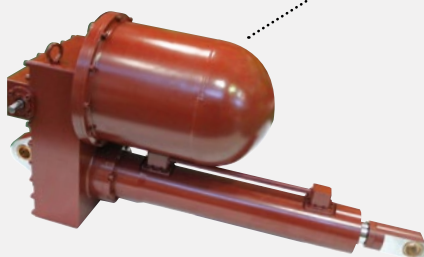


Rader Mast



## Actuator

for containment unit drive



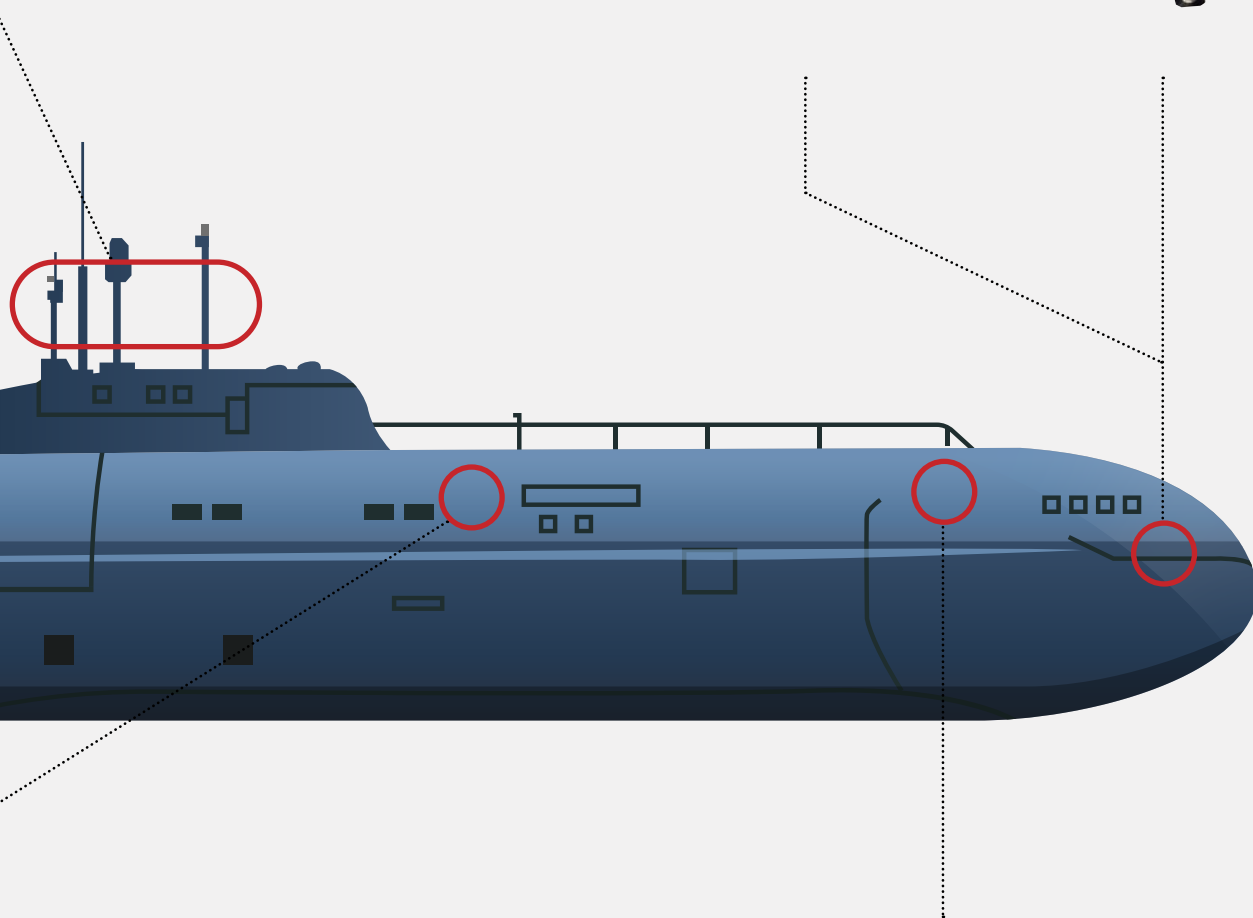
## Actuator

for torpedo launcher drive





**Actuator**  
for fastening of weapon



**Actuator**  
for torpedo launcher drive



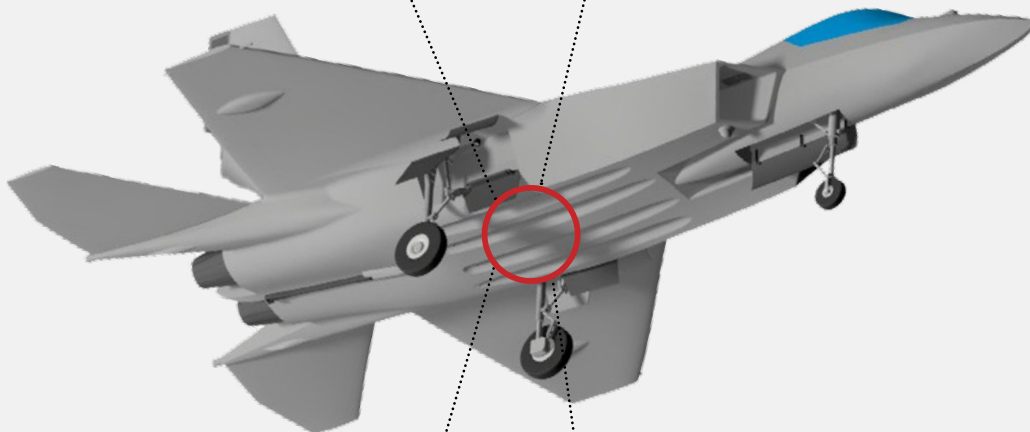
# Aviation

## Pneumatic Ejection System for Fighter

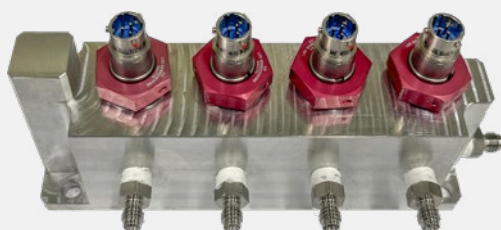
| Air Compressors Assembly-Dry Type



| Water – Oil Separator



| Isolation Valve(4way)



| Air Filter



# Aviation

## Ground Support Equipment for Aircraft

### Nitrogen Generator

PSA(Pressure Swing Adsorption) Type  
High Purity Nitrogen Generator(above 99.5%)



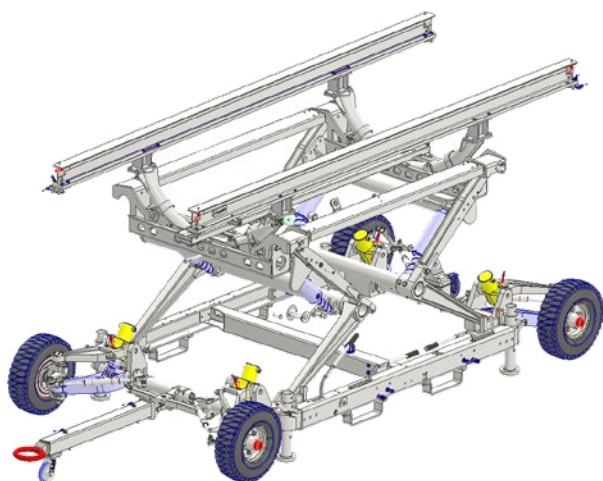
### Nitrogen Charging Trailer

Supplying high-pressure nitrogen to aircraft



### Trailer for Engine Installation

Trailer assembly for installation and removal of KF-21 Fighter engine



# Magnetic Levitation Train



Emergency Driving Assembly

Function	Roller driving system for emergency
Max. Force	17.8 kN
Operating Pressure	166 bar
Supply Voltage	24 VDC



Power Pack



Steering Cylinder

Function	Improve driving safety in curve sections
Type	Double rod, Double acting
Max. Operating Pressure	210 bar
Stroke	$\pm 210$ mm (inner), $\pm 76$ mm (outer)



Manifold

Function	Steering cylinder control
Operating Pressure	140 bar
Feature	Built-in sevo valve



Steering Cylinder

Function	Improve driving safety in curve sections
Type	Single rod, Double acting
Stroke	$\pm 159$ mm (Articulation), $\pm 13$ mm (Bogie)
Feature	Built-in LVDT



# Certificates and Patents

## Certificates



- 01 AS 9100
- 02 ISO 9001
- 03 ISO 14001
- 04 Defense Quality Management System (DQMS)

## Recognitions and Awards



- 01 R&D Center certificate
- 02 INNO-BIZ certificate
- 03 MAIN-BIZ certificate
- 04 Commendation for Secretary of Defense
- 05 The Best R&D Team Award of the Changwon city

## Patents



- 01 Piston Pump
- 02 Piston Pump
- 03 Quick Disconnect Coupling
- 04 Hydraulic Rotary Actuator
- 05 Hydraulic Rotary Actuator
- 06 Servo Valve Driving Apparatus

# Research and Development

## Overview

Established in 2003, the SG SERVO R&D Center has secured advanced technologies in the fields of servo hydraulic, electric drive, and hydropneumatic. As well as continuous investment in research and development, we are maximizing our research capability through a collaborative research system with various research institutes and academia.

We will continue to make further efforts to become a research institute that can provide total solutions for motion control system by preparing for future technologies in advance.

## Research Capability



### 01 2D/3D Design

- Design of optimal shapes and mechanism



### 02 Analysis

- Electromagnetic / FEM / Thermal / Flow Analysis (CFD)



### 03 Production

- Processing and assembly technology of Ultra-precision products



### 04 Test & Evaluation

- Development of automated performance test programs
- Verification of design and quality assurance of products

## R&D Cooperative Organization

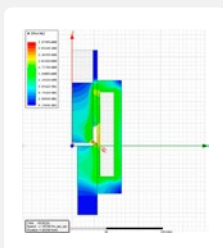
SG SERVO R&D Center is dedicated to R&D as best as possible to satisfy customer requirements through research cooperation with various institutions.



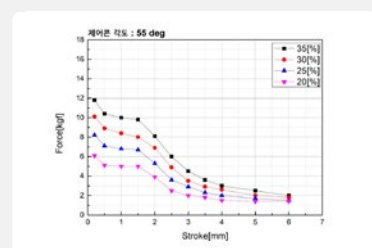
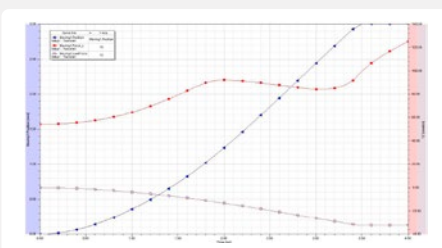
## Engineering Analysis

### Electromagnetic Analysis

- Optimal design of torque motor of servo valves
- Analysis of magnetic field of proportional valve, and analysis of electromagnetic field according to actuator cone angles and materials



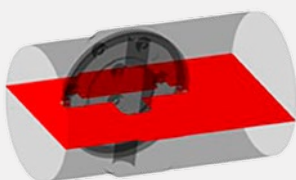
< Analysis of electromagnetic field according to materials and shapes of control cone >



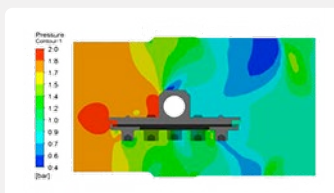
< Analysis of attractive force according to angle change of control cone >

### Flow Analysis

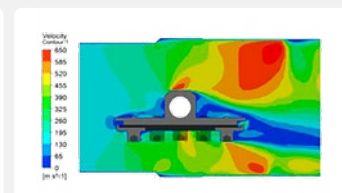
- Optimal design of components through flow analysis



a. Specific plane



b. Velocity contour in specific planes

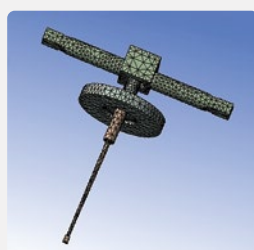


c. Pressure contour in specific planes

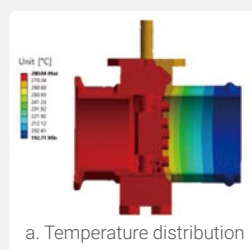
< Analysis of flow field in the valve plane >

### Structural and Thermal Analysis

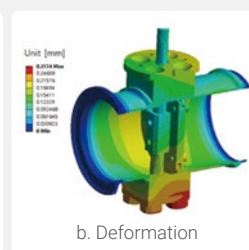
- Analysis of structural strength and fatigue life according to applied load and thermal stress



< Analysis of structural strength of servo valve flappers >



a. Temperature distribution



b. Deformation

< Temperature distribution and deformation of butterfly valve >

## Test and Evaluation

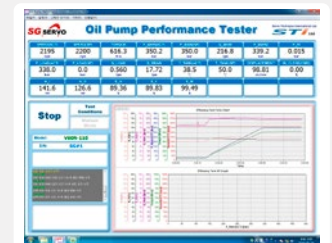
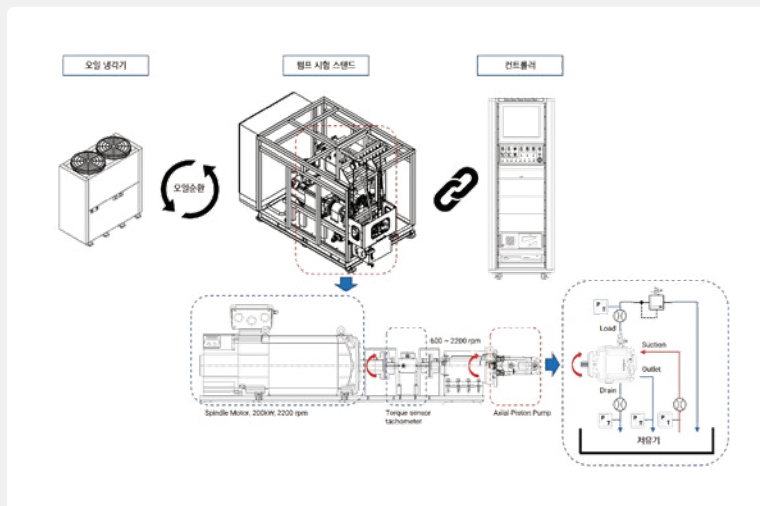
### Data Acquisition and Control Technology

- Design of data acquisition system using commercial program (Lab VIEW)
- Design of control system using Micro Processor Unit (MPU)
- Design of automated performance test system

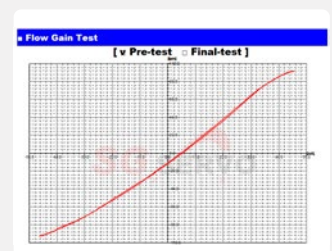
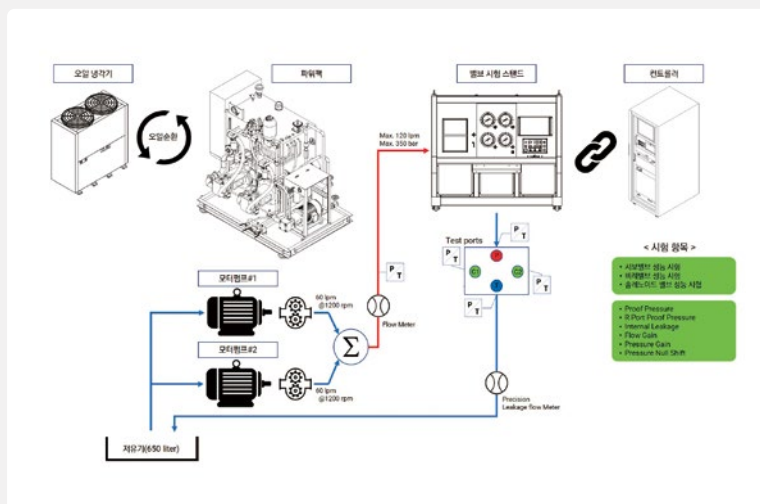


### Performance Test and Evaluation

- Performance test of pumps



- Performance test of valves





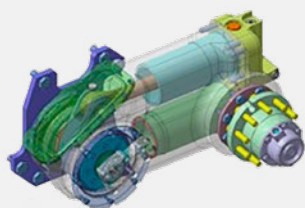
## R&D Performance and Vision

### R&D Performance 2002 ~ 2018

- Pumps, valves for transmissions of military tracked vehicles (K55 SPH, K21 IFV, K21 IFV)
- Design of hydraulic system and production of hydraulic components for K21 recovery vehicle
- Hydrostatic steering unit for transmission of K2 main battle tank
- Manifold and wheel valve for CTIS of K808 infantry combat wheeled vehicle
- Electric auto leveling system for ground vehicle
- Mast raising equipment and electric actuators for submarine
- Actuator and surge valve for APU of Korean Fighter
- Servo and proportional valves
- General hydraulic products (Piston Pumps, Quick Disconnect Couplings, Cylinder, Damper, etc)

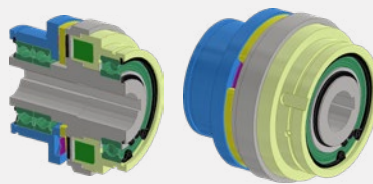
### Development Project in Progress 2019 ~ Present

- Hydrostatic steering unit for transmission of old Korean amphibious assault vehicle (KAAV I)
- Hydropneumatic suspension unit for Korean amphibious assault vehicle (KAAV II)
- Electromagnetic clutch
- Multiple drone launcher
- Exhaust valves for submarine
- Ground support equipment for aviation
- Pneumatic ejection system for fighter



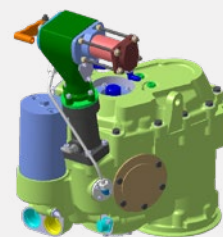
**Retractable Hydropneumatic  
Suspension Unit (KAAV II)**

Static Load	3.0 ton
Stroke	-108~328 mm



**Electromagnetic Clutch**

Rate Torque	40 Nm
Max. Speed	5,000 rmp
Driving Voltage	24 V



**Hydrostatic Steering Unit  
(KAAV I)**

Operating Pressure	41.4 Mpa
Displacement	106.5 cc/rev

# Facilities

We have the latest facilities and skilled professionals to process, assemble, test and evaluate the precision hydraulic and electric drive devices, and we require our clients with best products through thorough quality assurance.

## Test Facilities



No.	Facility	Spec.	Qty
1	Valve Test Equipment	315 bar / 130 lpm	1
2	Valve Test Equipment	210 bar / 12 lpm	1
3	Valve Test Equipment	345 bar / 80 lpm	1
4	Servo Valve Test Equipment	350 bar / 120 lpm	1
5	Pump / Valve Test Equipment	3~196 bar / 10~400 lpm, 4,600 rpm	1
6	Pump Test Equipment	200 kW / 250 lpm	1
7	Pump Test Equipment	146 lpm / 800 rpm	1
8	Motor Test Equipment	1,300 Nm / 600 rpm	1
9	PTO Test Equipment	1,180 rpm / 360 rpm	1

No.	Facility	Spec.	Qty
10	Pneumatic Distributor Test Equipment	0~4 bar	1
11	Freewheel Test Equipment	1 bar / 180~300 rpm	1
12	Quick Disconnect Coupling Test Equipment	70 bar / 70 lpm	1
		15 bar / 800 lpm	
13	Hydrostatic Steering Unit Test Equipment	700 bar / 51 lpm	1
		210 bar / 60 lpm	
		50 bar / 100 lpm	
14	Manifold / Wheel Valve Test Equipment	10 bar	1
15	Climatic Testing Chambers	-50°C~150°C / 30~98% (RH)	2



## Production / Inspection Facilities



No.	Facility	Model	Manufacturer	Qty
1	H-MCT	KH-80G	WIA, Etc.	4
2	V-MCT	VX500/50	WIA, Etc.	3
3	CNC	PUMA-GT2600	Doosan Infracore, Etc.	4
4	Honing Machine	CVH-03S	Cleantec, Etc.	2
5	Lapping Machine	KE-610	Ibche Corporation, Etc.	2
6	Ultrasonic Washer	UIL-40040H	UIL Ultrasonic	1
7	Laser Marking Machine	F9020	MACSA	2
8	Gage	395-271-30	MITUTOYO, Etc.	133

No.	Facility	Model	Manufacturer	Qty
9	3D Measuring Machine	CONTURA G2	ZEISS	1
10	2D Measuring Machine	Vertical 3	TRIMOS	2
11	Surface Tester	CD 120	Mahr	1
12	Fluid Control Unit	FCU 2110-4	HYDAC	1
13	Illuminometer	SJ 310	MITUTOYO	1
14	Hardness Tester	DTR-200N	Daekyung Tech, Etc.	2
15	Roundness Measuring Machine	EC1550	Kosaka	1
16	Tension and Compression Tester	SY10800-50	SHIN YOUNG	1



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