

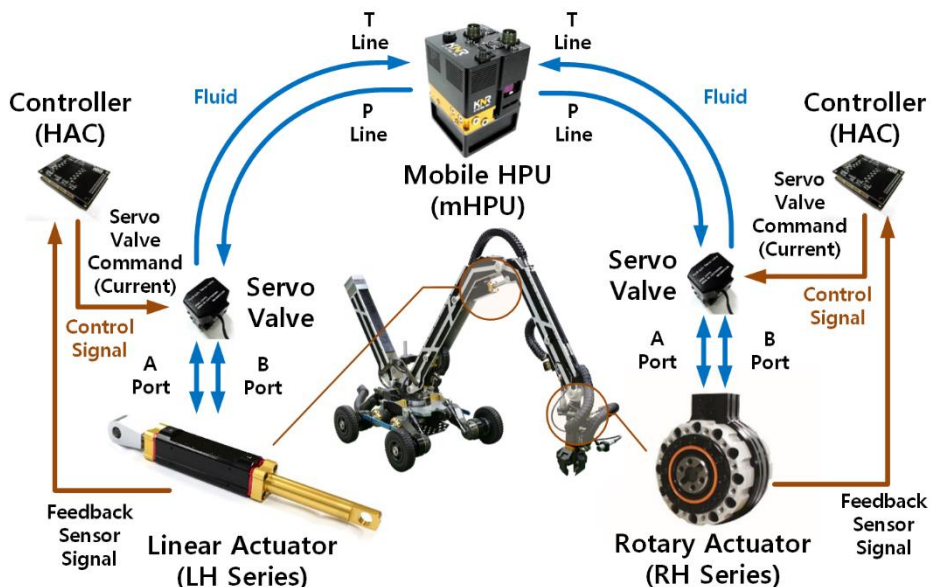
Small & Compact Product !

Customization Service !

KRH / KLH Series

KNR Systems Inc. develops high quality hydraulic components consisting of linear and rotary actuators, mobile or stationary hydraulic power units, and servo valves. These hydraulic components are mainly used in the field of robotics, where the components are connected to form a central controller for a robot.

We supply two main categories of hydraulic actuator products: KRH (Rotary Hydraulic actuator) and KLH (Linear Hydraulic Actuator). KRH Series a group of rotary actuators that can create rotational joints with high torque, without additional parts. KLH Series is a group of linear actuators used to implement prismatic motion or rotational motion using a link. The KRH/KLH Series can perform high precision closed loop feedback control, with the use of servo valves and specific sensors; generally, LVDT is used for linear movement control and RVDT or Encoder for the rotational control. We providing customization option with the KRH/KLH Series for the customers with specific purposes.



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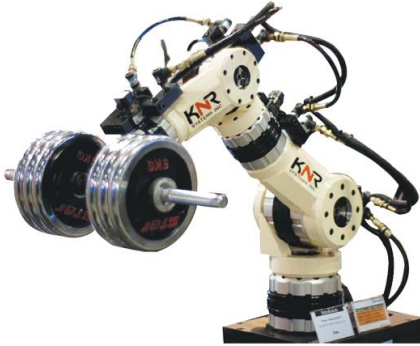
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HYDRAULIC LINEAR ACTUATOR

Your Benefit

Heavy load-carrying capacity

KNR's unique design achieves high FWR(Force to Weight Ratio) performance to meet the needs of various applications. And it supports heavy radial moment and thrust load without additional parts to make application systems robust and have high power density.



Compact design

Tight assemble with several parts permits double or single vane/stroke resulting in high torque/Force output from compact configurations. No mechanical part causes power loss.



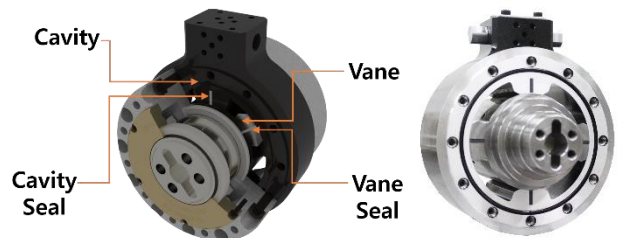
Flexibility

Shaft features a large diameter mounting flange with drilled and tapped bolt circle. It provides considerable application flexibility with directly connected linkages.



Less leakage

Sealing is applied against accurately manufactured smooth surfaces, effectively eliminating most of the leakage and enabling selected positions to be held without drift.

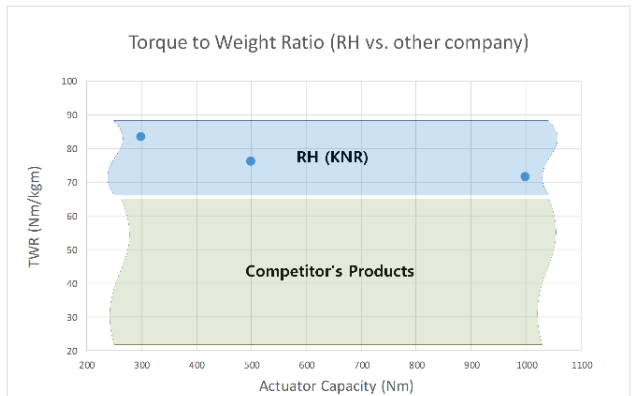
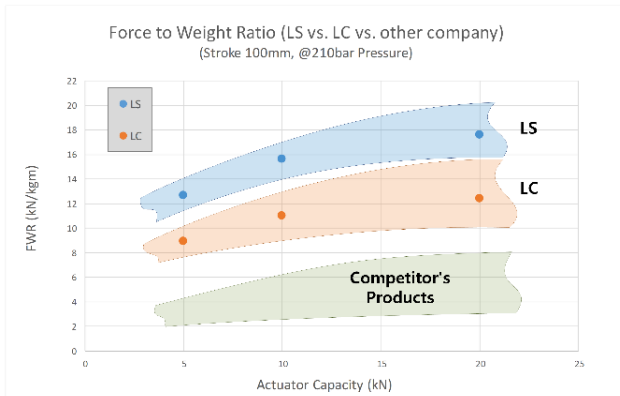
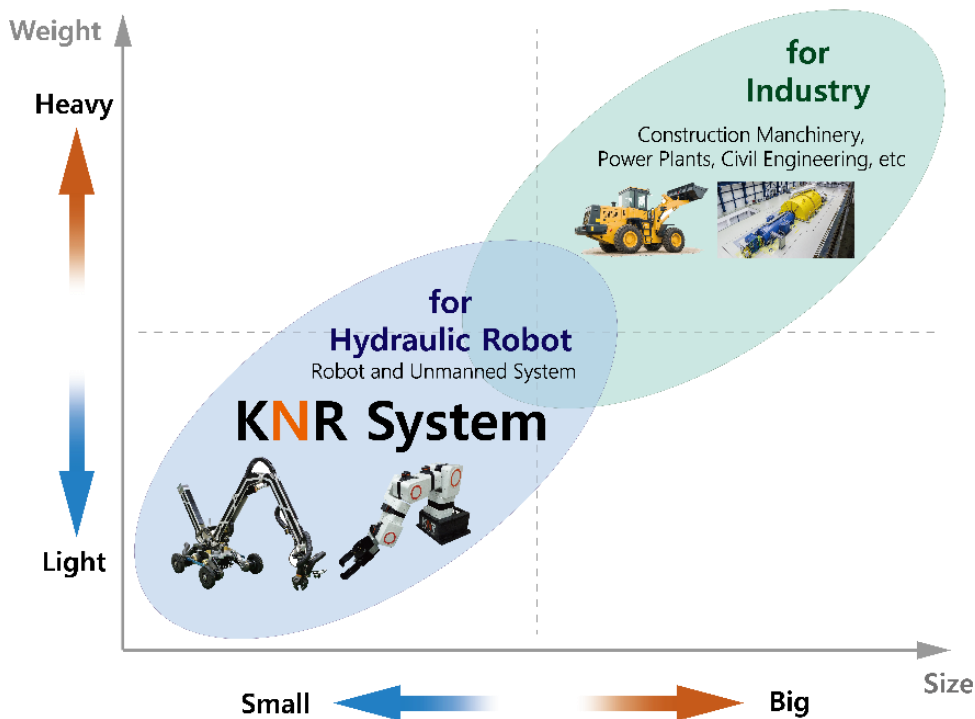


HYDRAULIC LINEAR ACTUATOR

Heavy load-carrying capacity

KNR Systems develops actuators that satisfies the needs in the filed of robotics and unmanned systems. Our actuators have higher "Force to weight" ratio compared to the products of competitors. And it supports heavy radial moment and thrust load without additional parts to make application systems robust and to have high power density.

Area of KNR's Actuator Coverage : fit for the use in small application such as robotics



Customization Service

Hydraulic Actuators have simple but compact design, making modifications easier for a specific purpose, when the standard model is not suitable. We can customize the products to meet your special specifications and actuator shapes, at an additional cost and period.

Customized Specification

- Stroke or Rotation Range
- Capacity
(KLH Series : Force / KRH Series : Torque)
- Internal Leakage & Friction

Customized Shape

- Actuator Size & Shape
- Hydraulic Mounting Type
- Mechanical Mounting Interface
(Joint Accessories)

Customizing Integrated Package Product

- Integrated Actuators including hydraulic servo valve, position sensor, pressure sensor and controller

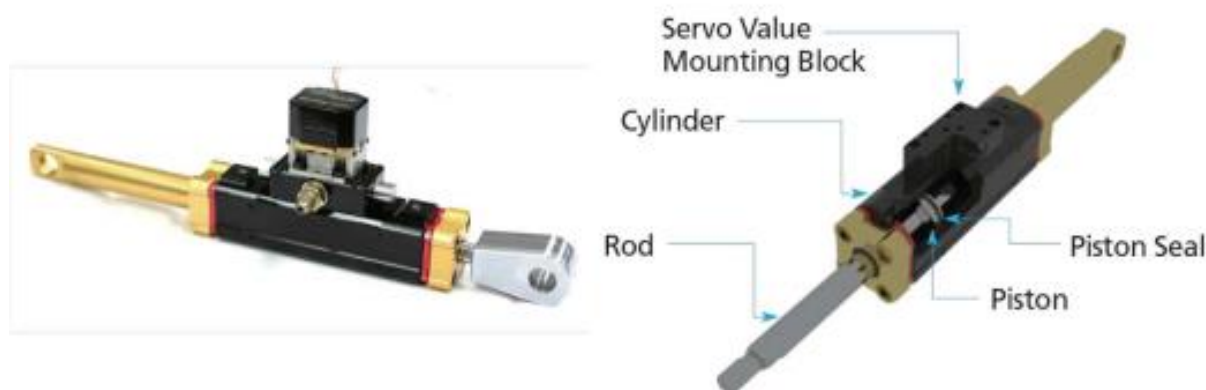


HYDRAULIC LINEAR ACTUATOR

HYDRAULIC LINEAR ACTUATOR (LH Series)

Linear Hydraulic actuators (KLH Series) is used to create linear motions. On the other hand, with an additional link, linear actuators can also create rotational motion as well. One advantage of linear actuators is that they can be made smaller and narrower than rotary actuators. The standard power of these actuators is from 5 to 20 kN (1122~4489 lbf) at 210 bar (3045 psi), but they can be specially customized to have appropriate power for many different purposes.

Compared to rotary actuators, linear actuators can come in smaller sizes. However, more attention is required when using linear actuators, as they apply different levels of torque depending on the angle of the links. Pressure, force, and displacement sensors can be used with the servo valve to provide better feedback and control. Single- and double-rod types are available to accommodate control and range of motion needs.



Technical Data

OUTPUT Torque	5, 10, 20 (kN) (1.12, 2.25, 4.5 lbf)
Stroke	20 ~ 150 mm (0.79 ~ 5.91 inch)
Rod Type	Single Rod Type , Double Rod Type
Nominal Pressure	210 (bar)
Min. Operating Pressure	6 (bar)
Cycle Lift	> 10 ⁷ cycles between seal change

HYDRAULIC LINEAR ACTUATOR

ORDERING CODE (KLH Series)

LS — S — 05 — 0020 — I — SV

Model

LS : Special Type

Rod Type

S : SINGLE ROD
D : DOUBLE ROD

Force 1)

05 : 05 (kN)
10 : 10 (kN)
20 : 20 (kN)

Stroke

0020 : 20 (mm)
0050 : 50 (mm)
0060 : 60 (mm)
0070 : 70 (mm)
0080 : 80 (mm)
0090 : 90 (mm)
0100 : 100 (mm)
0120 : 120 (mm)
0150 : 150 (mm)

Hydraulic Mount

SV : SERVO VALVE
T8 : AB PORT (PT) 1/8"
T4 : AB PORT (PT) 1/4"
F8 : AB PORT (PF) 1/8"
F4 : AB PORT (PF) 1/4"

Mount Type 2)

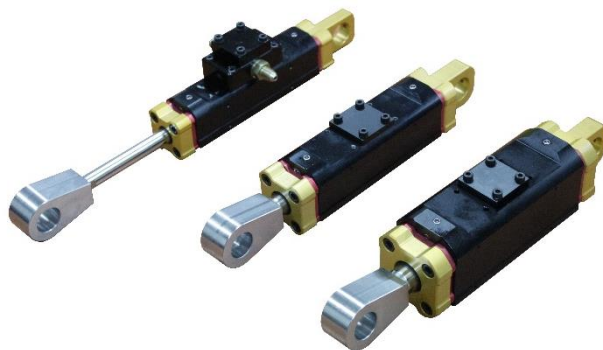
I : HINGE
FH : FRONT FLANGE MOUNT HOLE
FT : FRONT FLANGE MOUNT TAP
RH : REAR FLANGE MOUNT HOLE
RT : REAR FLANGE MOUNT TAP
BF : BASE FOOT

- 1) Force : Please refer to Page 4 (Force Specification)
- 2) Mount Type : Please refer to Page 5 (Mounting Type)

LS Series is the product to have various types to meet your needs as for hydraulic mount types and actuator mount types.

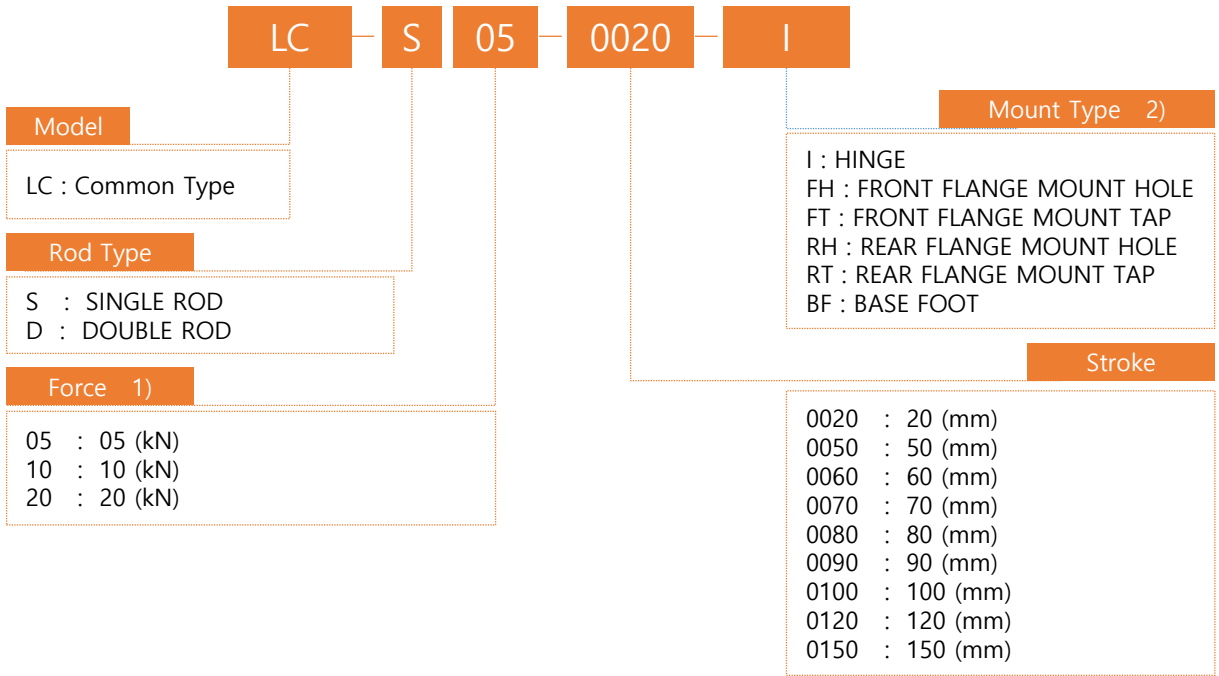
You can assemble a servo valve on a actuator directly or apply various hydraulic connectors.

And you can use various actuator mounting types



HYDRAULIC LINEAR ACTUATOR

ORDERING CODE (KLH Series)



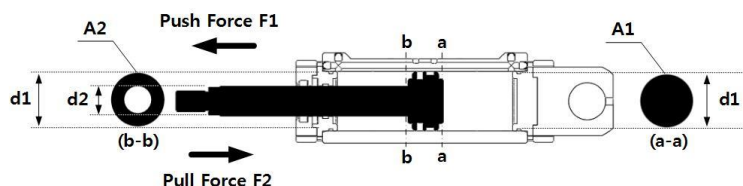
- 1) Force : Please refer to Page 4 (Force Specification)
- 2) Mount Type : Please refer to Page 5 (Mounting Type)



HYDRAULIC LINEAR ACTUATOR

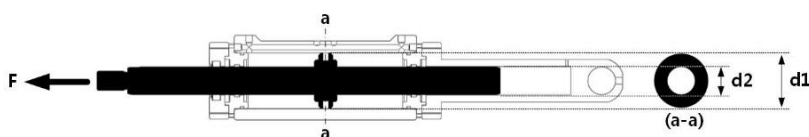
SPECIFICATION

Single Rod Type



Model	Piston (\varnothing , mm (in))	Rod (\varnothing , mm (in))	A1 (mm ² (in ²))	A2 (mm ² (in ²))	F1 (@210bar, kN (lbf))	F2 (@210bar, kN (lbf))
LSS05	22 (0.87)	12 (0.47)	380 (0.59)	267 (0.41)	7.98 (1794)	5.61 (1261)
LSS10	30 (1.18)	16 (0.63)	707 (1.1)	506 (0.78)	14.84 (3336)	10.62 (2387)
LSS20	40 (1.57)	20 (0.79)	1257 (1.95)	942 (1.46)	26.39 (5932)	19.79 (4449)
LCS06	22 (0.87)	12 (0.47)	380 (0.59)	267 (0.41)	7.98 (1794)	5.61 (1261)
LCS10	30 (1.18)	16 (0.63)	707 (1.1)	506 (0.78)	14.84 (3336)	10.62 (2387)
LCS20	40 (1.57)	20 (0.79)	1257 (1.95)	942 (1.46)	26.39 (5932)	19.79 (4449)

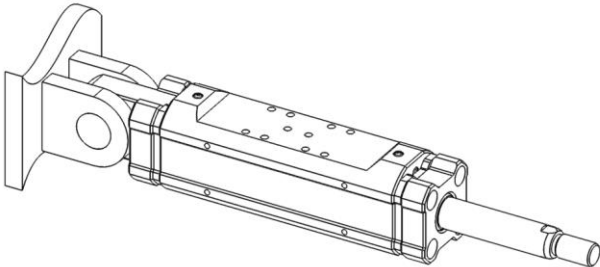
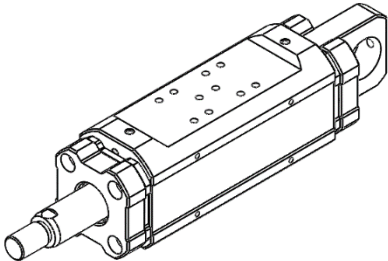
Double Rod Type



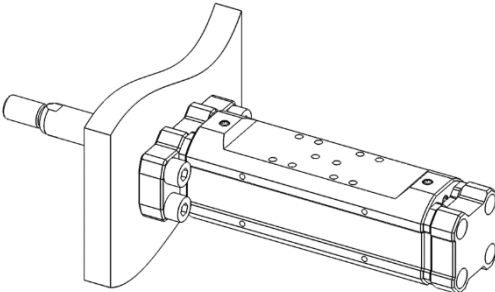
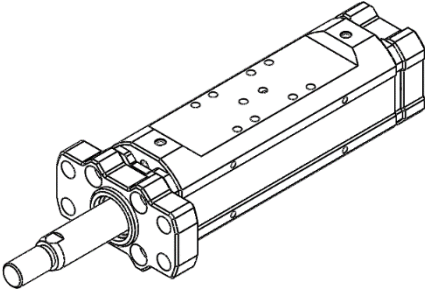
Model	Piston d1 (\varnothing , mm(in))	Rod d2 (\varnothing , mm(in))	A (mm ² (in ²))	F (@210bar, kN)
LSD05	22 (0.87)	12 (0.47)	267 (0.41)	5.61 (1261)
LSD10	30 (1.18)	16 (0.63)	506 (0.78)	10.62 (2387)
LSD20	40 (1.57)	20 (0.79)	942 (1.46)	19.79 (4449)
LCD06	22 (0.87)	12 (0.47)	267 (0.41)	5.61 (1261)
LCD10	30 (1.18)	16 (0.63)	506 (0.78)	10.62 (2387)
LCD20	40 (1.57)	20 (0.79)	942 (1.46)	19.79 (4449)

Mounting Type

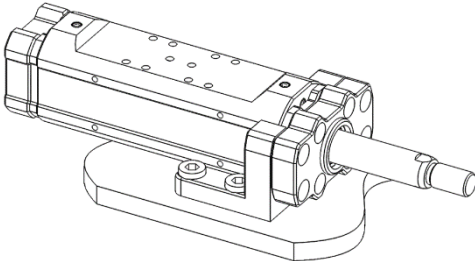
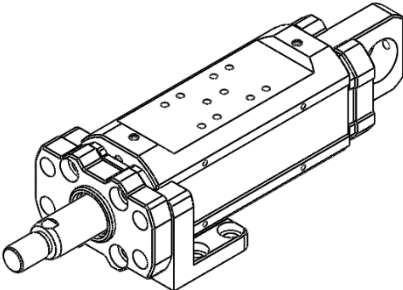
Hinge Type



Flange Type



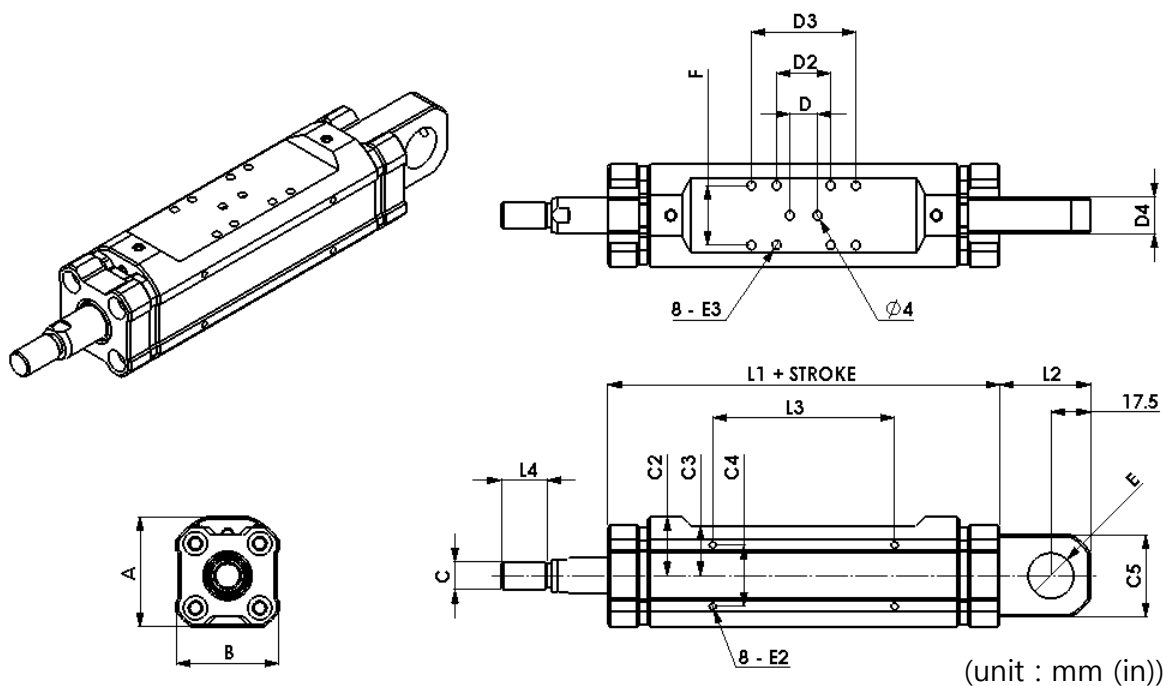
Base Foot Type



HYDRAULIC LINEAR ACTUATOR

DIMENSION

Single Rod - Base Type



Model	A	B	C	C2	C3	C4	C5	D
LSS05	40.5 (1.59)	37 (1.46)	M8	22 (0.87)	17.5 (0.69)	20 (0.79)	30 (1.18)	12.2 (0.48)
LSS10	48.5 (1.91)	45 (1.77)	M12	26 (1.02)	22 (0.87)	27 (1.06)	36 (1.42)	12.2 (0.48)
LSS20	60.5 (2.38)	55 (2.17)	M14	32.5 (1.28)	28.5 (1.12)	37.6 (1.48)	36 (1.42)	12.2 (0.48)

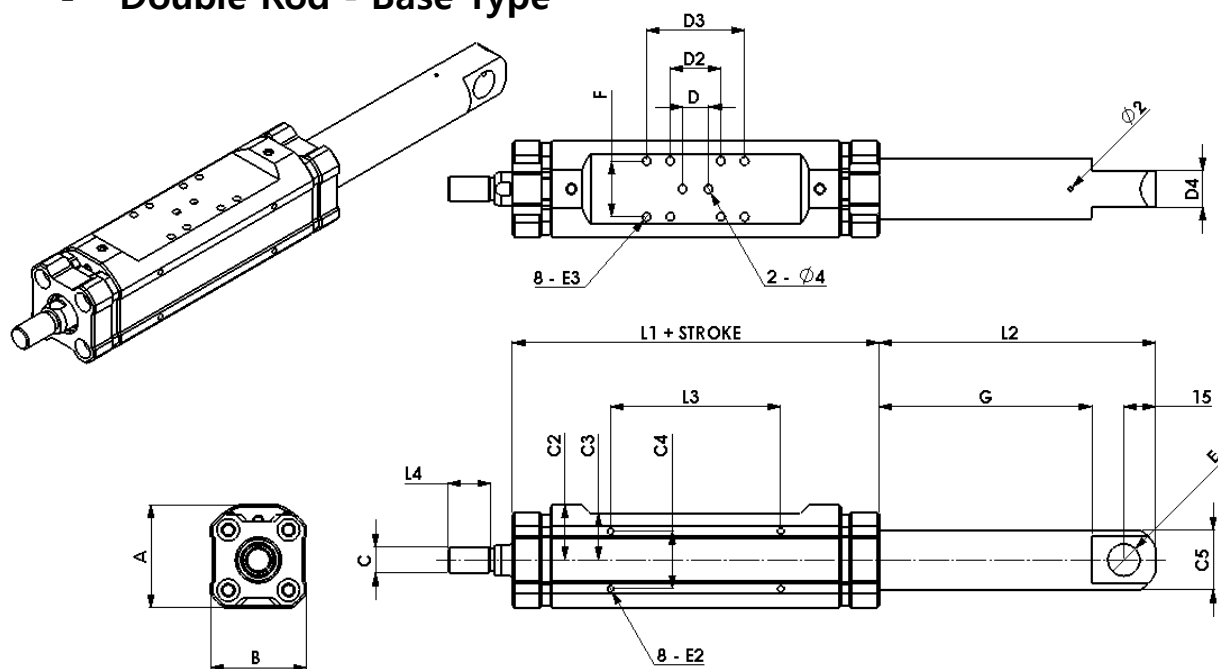
Model	D2	D3	D4	E (+0.02)	E2	E3	F
LSS05	23.8 (0.94)	46 (1.81)	16 (0.63)	15 (0.59)	3 (0.12)	4 (0.16)	26.2 (1.03)
LSS10	23.8 (0.94)	46 (1.81)	17 (0.67)	20 (0.79)	3 (0.12)	4 (0.16)	26.2 (1.03)
LSS20	23.8 (0.94)	46 (1.81)	18 (0.71)	25 (0.98)	3 (0.12)	4 (0.16)	26.2 (1.03)

Model	L1 + STROKE	L2	L3	L4
LSS05	72.4 (2.85) + STROKE	40 (1.57)	80 (3.15)	14 (0.55)
LSS10	72.4 (2.85) + STROKE	40 (1.57)	80 (3.15)	20 (0.79)
LSS20	72.4 (2.85) + STROKE	40 (1.57)	82.2 (3.24)	20 (0.79)

HYDRAULIC LINEAR ACTUATOR

DIMENSION

Double Rod - Base Type



(unit : mm (in))

Model	A	B	C	C2	C3	C4	C5	D
LSS05	40.5 (1.59)	37 (1.46)	M8	22 (0.87)	17.5 (0.69)	20 (0.79)	21 (0.83)	12.2 (0.48)
LSS10	48.5 (1.91)	45 (1.77)	M12	26 (1.02)	22 (0.87)	27 (1.06)	28 (1.1)	12.2 (0.48)
LSS20	60.5 (2.38)	55 (2.17)	M14	32.5 (1.28)	28.5 (1.12)	37.6 (1.48)	30.5 (1.2)	12.2 (0.48)

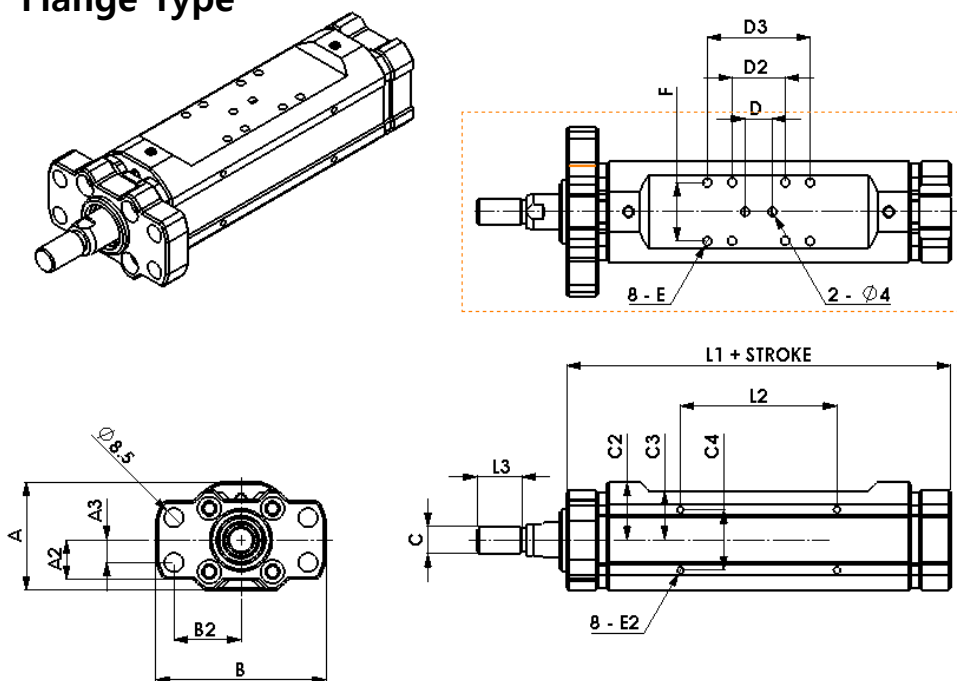
Model	D2	D3	D4	E (+0.02)	E2	E3	F
LSS05	23.8 (0.94)	46 (1.81)	10 (0.39)	15 (0.59)	3 (0.12)	4 (0.16)	26.2 (1.03)
LSS10	23.8 (0.94)	46 (1.81)	17 (0.67)	20 (0.79)	3 (0.12)	4 (0.16)	26.2 (1.03)
LSS20	23.8 (0.94)	46 (1.81)	19.5 (0.77)	25 (0.98)	3 (0.12)	4 (0.16)	26.2 (1.03)

Model	L1 + STROKE	G	L2	L3	L4
LSS05	72.4 (2.85) + STROKE	100 (3.94)	130 (5.12)	80 (3.15)	20 (0.79)
LSS10	72.4 (2.85) + STROKE	100 (3.94)	130 (5.12)	80 (3.15)	20 (0.79)
LSS20	72.4 (2.85) + STROKE	100 (3.94)	130 (5.12)	80 (3.15)	20 (0.79)

HYDRAULIC LINEAR ACTUATOR

DIMENSION

Flange Type



(unit : mm (in))

Model	A	A2	A3	B	B2	C	C2	C3
LSS05	40.5 (1.59)	14.5 (0.57)	8 (0.31)	68 (2.68)	27 (1.06)	M8	22 (0.87)	17.5 (0.69)
LSS10	48.5 (1.91)	17.5 (0.69)	10 (0.39)	76 (2.99)	30 (1.18)	M12	26 (1.02)	22 (0.87)
LSS20	60 (2.36)	22.5 (0.89)	12 (0.47)	85 (3.35)	33 (1.3)	M14	32.5 (1.28)	28.5 (1.12)

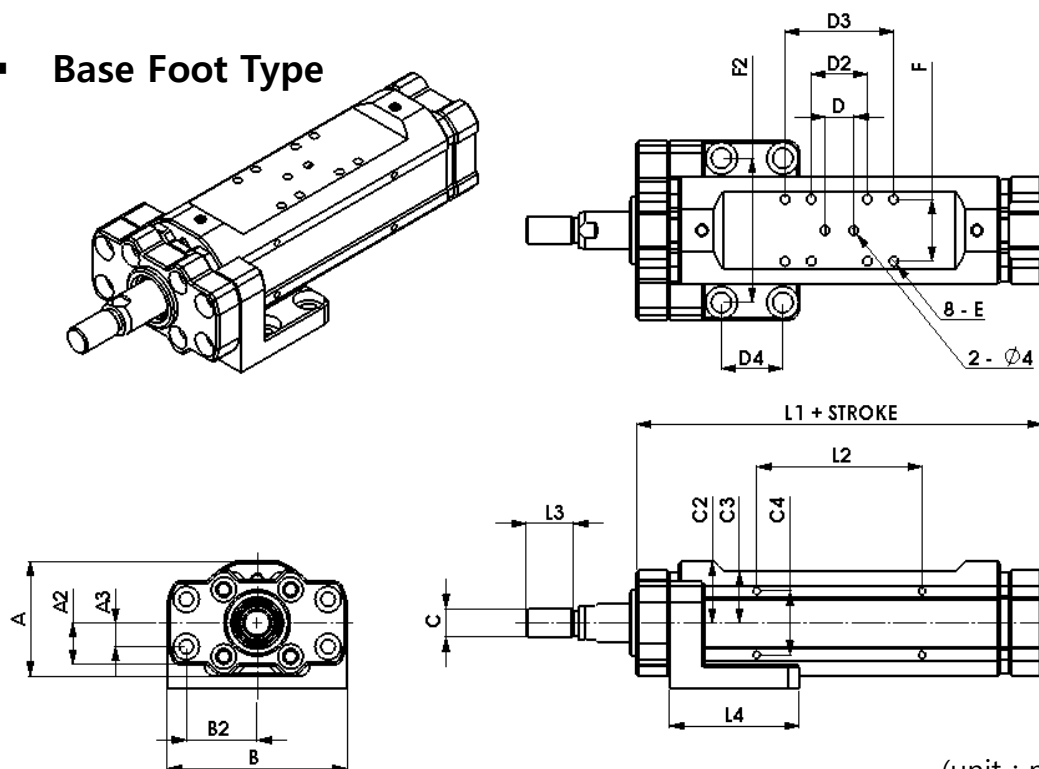
Model	C4	D	D2	D3	E	F
LSS05	20 (0.79)	12.2 (0.48)	23.8 (0.94)	46 (1.81)	4 (0.16)	26.2 (1.03)
LSS10	27 (1.06)	12.2 (0.48)	23.8 (0.94)	46 (1.81)	4 (0.16)	26.2 (1.03)
LSS20	37.6 (1.48)	12.2 (0.48)	23.8 (0.94)	46 (1.81)	4 (0.16)	26.2 (1.03)

Model	L1 + STROKE	L2	L3
LSS05	72.4 (2.85) + STROKE	70 (2.76)	20 (0.79)
LSS10	72.4 (2.85) + STROKE	70 (2.76)	20 (0.79)
LSS20	72.4 (2.85) + STROKE	70 (2.76)	20 (0.79)

HYDRAULIC LINEAR ACTUATOR

DIMENSION

▪ Base Foot Type



(unit : mm (in))

Model	A	A2	A3	B	B2	C	C2	C3
LSS05	40.5 (1.59)	14.5 (0.57)	8 (0.31)	68.5 (2.7)	27 (1.06)	M8	22 (0.87)	17.5 (0.69)
LSS10	48.5 (1.91)	17.5 (0.69)	10 (0.39)	76 (2.99)	30 (1.18)	M12	26 (1.02)	22 (0.87)
LSS20	66 (2.6)	22.5 (0.89)	12 (0.47)	86 (3.39)	33 (1.3)	M14	32.5 (1.28)	28.5 (1.12)

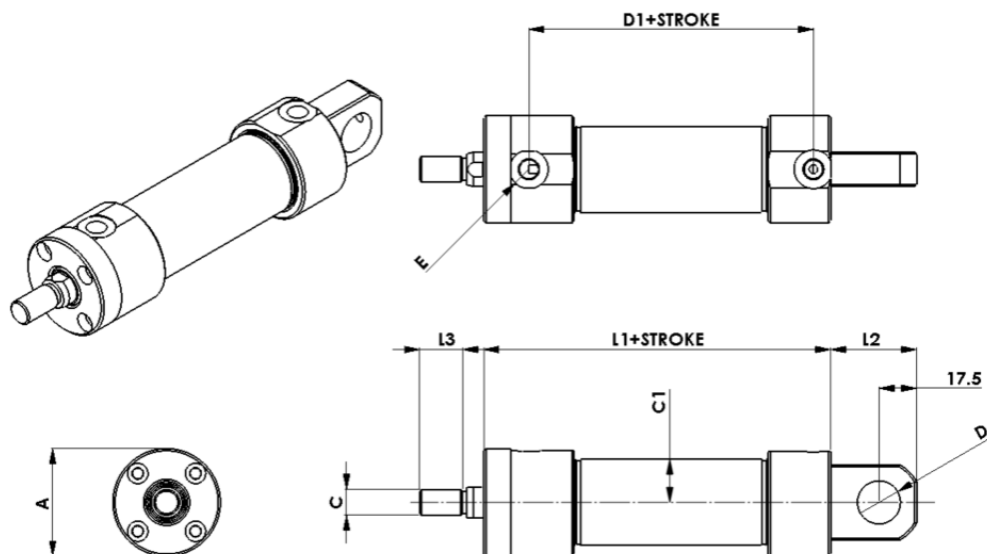
Model	C4	D	D2	D3	D4	E	F	F2
LSS05	20 (0.79)	12.2 (0.48)	23.8 (0.94)	46 (1.81)	26 (1.02)	4 (0.16)	26.2 (1.03)	53 (2.09)
LSS10	27 (1.06)	12.2 (0.48)	23.8 (0.94)	46 (1.81)	26 (1.02)	4 (0.16)	26.2 (1.03)	61 (2.4)
LSS20	37.6 (1.48)	12.2 (0.48)	23.8 (0.94)	46 (1.81)	26 (1.02)	4 (0.16)	26.2 (1.03)	70.8 (2.79)

Model	L1 + STROKE	L2	L3	L4
LSS05	72.4 (2.85) + STROKE	70 (2.76)	20 (0.79)	55 (2.17)
LSS10	72 (2.83) + STROKE	70 (2.76)	20 (0.79)	55 (2.17)
LSS20	73.4 (2.89) + STROKE	70 (2.76)	20 (0.79)	55 (2.17)

HYDRAULIC LINEAR ACTUATOR

DIMENSION

- LC Series



(unit : mm (in))

Model	A	C	C1	D	D1 + STROKE
LCS05	Ø46 (1.81)	M10	17 (0.67)	20 (0.79)	32.3 (1.27) + STROKE
LCS10	Ø50 (1.97)	M12	20 (0.79)	20 (0.79)	32.3 (1.27) + STROKE
LCS20	Ø60 (2.36)	M14	25 (0.98)	20 (0.79)	34.3 (1.35) + STROKE

Model	E	L1+STROKE	L2	L3
LCS05	G1/8	61.3 (2.41) + STROKE	40 (1.57)	20 (0.79)
LCS10	G1/8	61.3 (2.41) + STROKE	40 (1.57)	20 (0.79)
LCS20	G1/8	63.3 (2.49) + STROKE	40 (1.57)	20 (0.79)

HYDRAULIC LINEAR ACTUATOR

APPLICATIONS

▪ Manipulator



HYDRA-UW
(KNR's Underwater Manipulator)



HYDRA-MP3
(KNR's Multi-Purpose Manipulator)

▪ Field Robot



GIBBON
(KNR's Hydraulic Mobile Robot in a nuclear power plant)



DCR

(KNR's Hydraulic Mobile Robot in high dust & high temperature environment)

NCR

