

V.R.C. System with Hydraulic Actuators



Hydraulic 1/4 turn Actuators

Rack and pinion type



Double acting actuator (Rack and pinion)

Model HQ10, HQ25, HQ50, HQ100, HQ200 for Medium duty Service.

Scotch yoke type



Double acting actuator (Scotch yoke)

Model HQ400, HQ800, HQ1600 for Heavy duty Service

Single acting actuator



Single acting actuator (Spring return)

Model HQs10, HQs25, HQs50, HQs100, HQs200, HQs400, HQs800, HQs1600.
Output torque up to 25,000Nm.

Construction:

- Gear box and cylinder in ductile cast iron, or stainless steel on request.
- High chrome steel rack and pinion gear.
- Stainless steel bolting or alloy steel.
- Stainless steel position indicator.
- Cylinder seal with phenol resin slide ring.
- High performance alloy steel, mechanical stops and alloy steel end cap.

External Coating:

Anti-corrosion primary and secondary coating with polyurethane paint-min. 100~250µ thickness, suitable for marine environment service.

Product Range - Characteristics

HQ10/HQ1600

Designed for the operation of any type of 1/4 turn valve, the HQ hydraulic actuator series offers output torque values up to 32,585 Nm. The rack and pinion kinematics for medium duty and the scotch yoke symmetric for heavy duty service of these actuators offer the following advantages:

- Accurate and reliable operation
- Constant output torque
- High performance with minimum overall dimensions
- Reliable long-life performance
- Suitable for submerged service
- Stroke adjustment within $\pm 3\text{--}5^\circ$
- Any position indicator can be easily mounted
- Maximum working pressure 160bar



The range of HQ series actuators consist of 8 double acting (HQ) and 8 single acting (HQs) models: HQ10, HQ25, HQ50, HQ100, HQ200, HQ400, HQ800, HQ1600 & HQs10, HQs25, HQs50, HQs100, HQs200, HQs400, HQs800, HQs1600.

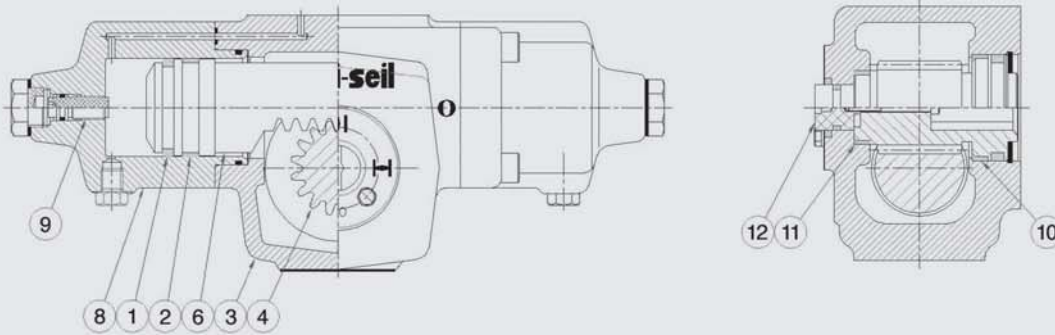
Equipped with interchangeable inserts, they can be easily adapted to different valve shaft designs (square, flat end etc.). They can be mounted in four positions, at intervals of 90° .

Double Acting 1/4 Turn Actuators

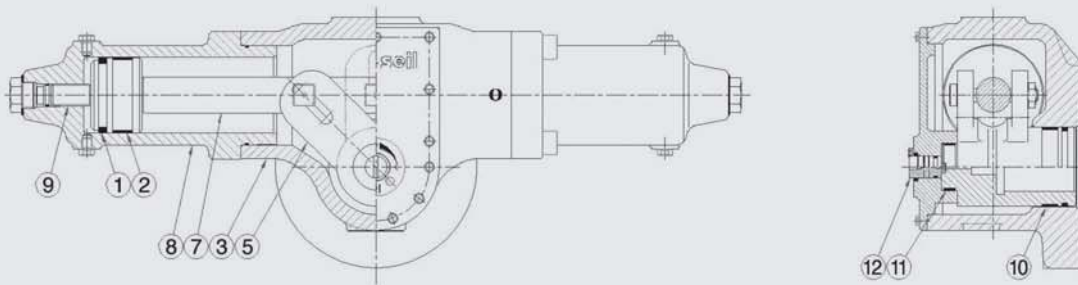
HQ Series Model	Output torque (Nm)					Nominal capacity (cm ³)	Mounting plate (ISO 5211)
	80 bar	100 bar	120 bar	140 bar	160 bar		
HQ10	113	141	169	198	226	22.66	F05, F07
HQ25	314	392	471	549	616	61.69	F07, F10
HQ50	588	735	882	1,029	1,175	115.47	F10, F12
HQ100	1,130	1,413	1,696	1,979	2,251	222.09	F12, F14
HQ200	2,544	3,180	3,817	4,453	5,047	499.65	F14, F16
HQ400	5,100	6,376	7,651	8,926	10,002	1,275.00	F16, F25
HQ800	8,958	11,197	13,436	15,676	17,915	2,284.00	F25, F30
HQ1600	16,293	20,366	24,439	28,512	32,585	4,156.00	F30, F35

Actuator Components and Materials

HQ10 to HQ200 (Rack and Pinion type)



HQ400 to HQ1600 (Scotch Yoke type)



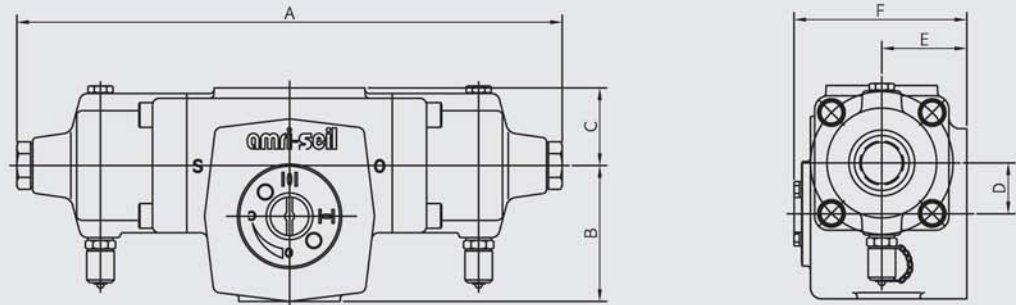
Part list for "HQ" Actuators

Item	Parts	Materials
01	Lip seal	Urethane
02	Wear ring	Phenolic resin
03	Body	Ductile cast iron or Stainless steel
04	Pinion	Alloy steel
05	Fork lever	Ductile cast iron or steel casting
06	Rack	Alloy steel
07	Drive rod	Alloy steel
08	Cylinder	Ductile cast iron
09	Stroke limiter	Stainless steel or Alloy steel
10	Wear ring	Phenolic resin
11	Wear ring	Phenolic resin
12	Indicator	Stainless steel

Note: All component materials are in accordance with JIS & KS standards.
Other materials are available on request.

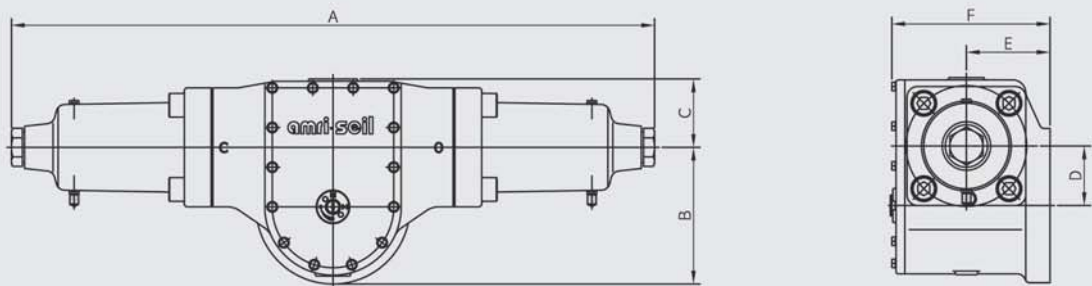
Overall Dimension and Weights

HQ10 to HQ200 (Rack and Pinion type)



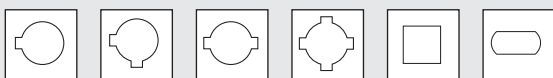
Model	A	B	C	D	E	F	Weight
HQ10	290	64.5	42.5	22	47	97	9
HQ25	325	82	50.5	30	56	112	15
HQ50	399	99	56.5	37	62	126	23
HQ100	479	121	67.5	48	78	154	42
HQ200	635	160	76	69	93.5	183	85

HQ400 to HQ1600 (Scotch Yoke type)



Model	A	B	C	D	E	F	Weight
HQ400	920	217	98	90	113	219	95
HQ800	1219	260	123.5	110	150	282	200
HQ1600	1456	310	155	135	190	363	600

Available Adaptor Styles



Linear Hydraulic Actuator

Linear Hydraulic Actuator



LH Series

Model LH30, LH40, LH60, LH90, LH110, LH135, LH175, LH220 and LH320.

Double acting actuator

LH series offers output thrust up to 700,000N.

Single acting actuator

LHs series offers output thrust up to 150,000N.

Construction:

- Gear box and cylinder in ductile cast iron, or stainless steel on request.
- Chromium plated seamless carbon steel cylinder.
- Chromium plated and heat treated high tensile steel piston rod.
- High tensile or stainless steel bolts with anti-corrosion coatings for tie-rods.
- All bolts and nuts are made of stainless steel for anti-corrosion purposes.

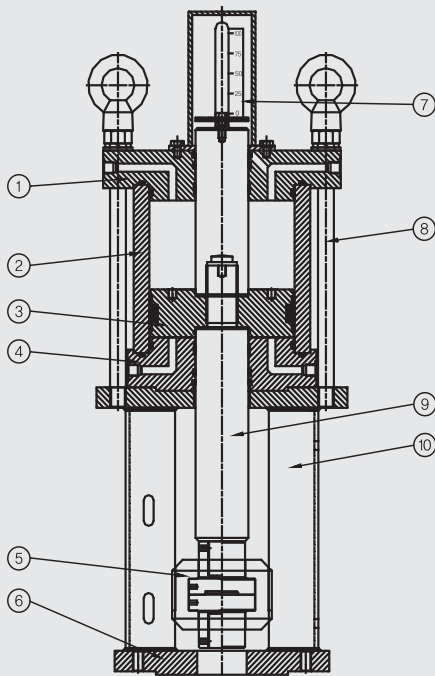
External Coating:

- Anti-corrosion primary and secondary coating with poly-urethane or epoxy paint, minimum 100~250µm thickness, suitable also for marine and on/off-shore environment service.
- Other specifications are available on request.

Product Range-Characteristics

LH30/LH320

Designed for the operation of linear movement such as gate, globe and other linear operated valves, the LH series offers output thrust values up to 700,000N in standard version, and up to 1,000,000N upon request.



Typical drawing for LH actuator

These actuators offer the following advantages:

- Seamless pipe cylinder construction with chrome plating surface.
- Easy connection and mounting to ISO standard.
- Standard design pressure up to 160 bar.
- Manual override by hydraulic hand pump unit, available.
- Suitable design for open/shut, positioning, and emergency shut down control.

The range of LH series actuators consists of 9 models with thrust values as follows; Other size of models are available on request.

LH Series	Thrust (N)		
	80 barg	120 barg	160 barg
LH30	3,700	5,600	7,500
LH40	7,000	10,500	14,000
LH60	17,400	26,100	34,800
LH90	40,200	60,300	80,400
LH110	58,900	88,400	117,800
LH135	91,900	137,900	183,900
LH175	154,000	231,600	308,800
LH220	245,600	368,500	491,300
LH320	467,300	701,000	934,700

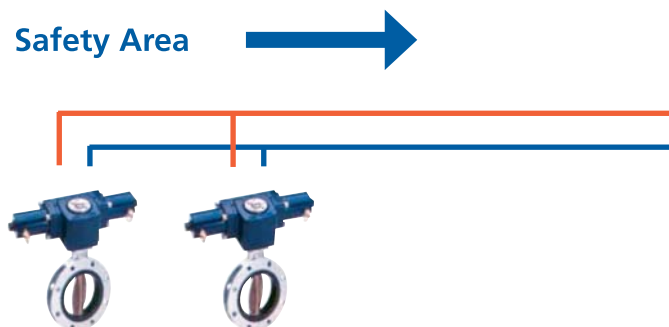
Part list for LH actuators

Item	Parts	Materials
01	UP.flange	Carbon steel
02	Cylinder	Carbon steel
03	Piston	Carbon steel
04	LW.flange	Carbon steel
05	Stem coupling	Stainless steel
06	Mounting flange	Carbon steel
07	Visual indicator	Bronze
08	Tie rod	Alloy or stainless steel
09	Drive rod	Alloy or stainless steel
10	Valve bracket	Carbon steel

Note: All component materials are in accordance with JIS & KS standards. Other materials are available on request.

The AMRI-SEIL VRC System is designed for position indication and electro-hydraulic remote control of hydraulically actuated valves. The principle of the VRC System is that pressurized oil, generated by the power pack, is used to open or close the valve by means of the solenoid controlled actuator.

Safety Area



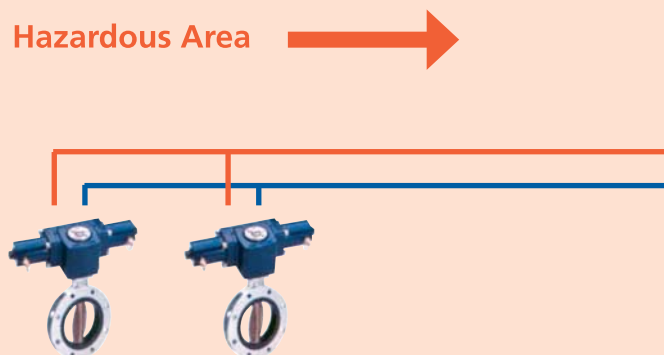
The actuated valves are installed in safety area.
(Ballast and Engine room etc)

Solenoid Valve Rack



Solenoid valves are used to control the direction of oil flow to each actuators operated by an electric signal from control console installed in safety area.

Hazardous Area



The actuated valves are installed in hazardous area.
(In-tank and On-deck)

Deck Box



The deck box controls the functions of each actuated valve installed in hazardous areas via explosion proof solenoid valves.

Valve Remote Control System

Interface Panel



The interface panel consisting of relays, Power supplier, Converters and Barriers, etc., is required to communicate between valves and computerized control system.

Automation System



Remote operation by the computerized system.

Hydraulic Power Pack



The hydraulic power unit consists of oil tank, electric motor & hydraulic pump which generates the required system operating pressure.

Control console & Mimic panel



Remote operation of the conventional type by the control console with mimic panel.

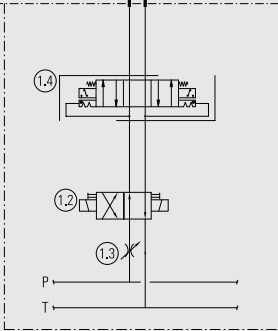
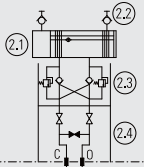
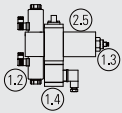
- Electric line
- Hydraulic pressure line
- Hydraulic return line

Valve Remote Control System

Hydraulic schematic diagram

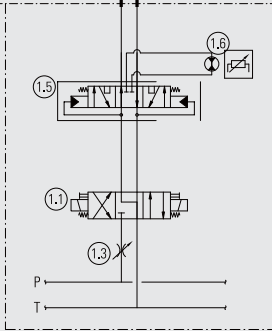
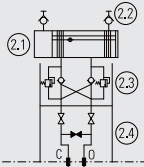
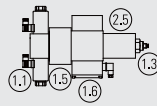
OPEN/SHUT VALVES CONTROL

ENERGIZED TYPE – POSITION INDICATOR APPLICATION



THROTTLING VALVE CONTROL

DE-ENERGIZED TYPE - FLOW METER APPLICATION



The VRC system is designed for positioning indication and electro-hydraulic remote control of hydraulically actuated valves.

The principle of the VRC system is that pressurized oil, generated by the power pack, is used to open or close the valve by means of the solenoid controlled actuator.

Hydraulic circuit components:

Item	Parts	Item	Materials
1.1	Directional solenoid control valve (4/3 way)	2.1	Hydraulic quarter turn actuator
1.2	Directional solenoid control valve (4/2 way)	2.2	Emergency hand pump connection
1.3	Flow reducer	2.3	Safety block
1.4	Hydraulic position indicator	2.4	Isolating valve block
1.5	Selector block	2.5	Base block
1.6	Digital Flow meter	2.5	

Main components and Accessories



Emergency hand pump, stationary pump unit and accumulators.

Designed for emergency manual operation of hydraulic actuator or any kind of cylinders.



Limit Switch box, Limit Switches and Hydraulic position indicator.

- Aluminium die-casting housing with heat-treated powder coating or Stainless steel.
- Waterproof IP67, Explosion proof. (Mechanical, Proximal, Potentiometer)
- Easy mounting, NAMUR standard shaft and bracket.



Declutchable manual gear boxes

- The gear boxes can be used for the emergency manual operation of hydraulic and pneumatic quarter-turn actuators.

Valve Remote Control System

Main components and Accessories



I.S barrier – Ex ia IIC



I.S power supply – Ex ia IIC



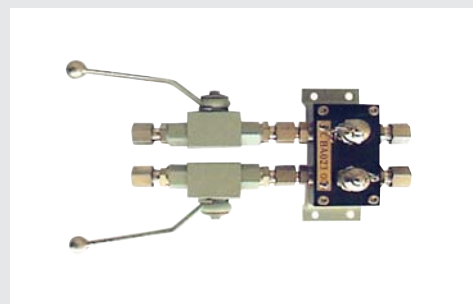
Multi-relay units & Keeper relay unit



I.S solenoid valve & hydraulic control valve Assembly – Ex ia(b) IIC T6, IP67



Emergency control connection valves



In-tank hand-pump connection block

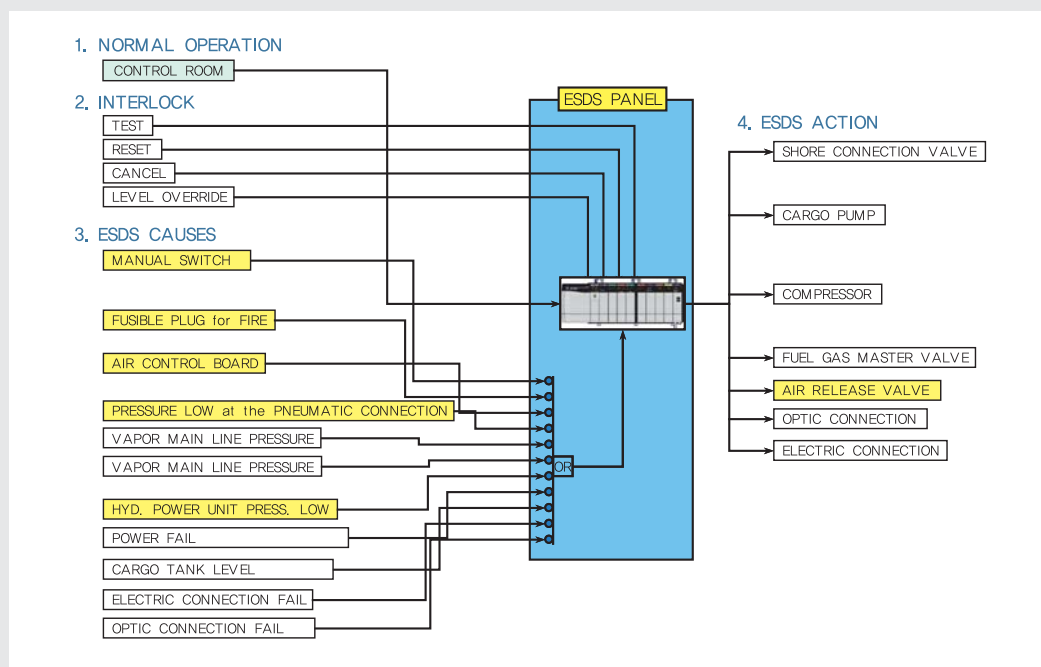
The details for the other components are available on request.

Emergency Shutdown System(ESDS)

The ESD system is required for protection of LNG carrier from various possible accidents and incidents during the operation of applicable systems and equipment, i.e, the ESD system is designed for protection of the vessel from dangerous situations during LNG cargo loading or unloading at a LNG terminal, to quickly stop all operations in pre-defined emergency situations.

Simultaneous functions to be made upon the occurrence or detection of hazardous situations are programmed into the ESD system.

The contents of the ESD system are illustrated by the following block diagram:



Main Control Panel

- CPU redundancy
- Power and network redundancy
- UPS applied for supplying electric power

Pressure Switch/Transmitter Box

- Smart type transmitter with a local display
- Picks up pneumatic ESD signal from the shore

Solenoid Valve Box

- Apply safety shut off valve (Ex-i or Ex-d type)

Air Control Board

- Configured for worldwide operation.
- Operating pressure monitored by pressure switches or pressure transmitter (select by customer)

Fusible Plug Box of IP56 rating

- Uses UL, C-UL, CSA, VDE, TUV, BEAB, MITI, EASC, KETI certified fusible plugs

Manual Pushbutton Box

- Supplied with IP66 pushbuttons

Quality Control of ISO 9001



Major Delivery Reference

Type	Representative Owners	Representative Shipyards
COT/ Shuttle	Active, Geden(Turkey), Almi Tankers, Cardiff(Greece), Frontline, Knutsen, Viken(Norway), Stena(Sweden), Chevron(USA), Interorient(Cyprus), Emarat(UAE), Novoship, Sovocomflot(Russia), Petrobras(Brazil)	HHI, HHIC, HSHI, DSME, SHI (Korea) Rongsheng (China) EAS (Brazil)
CNTR	Danaos, Dynacom(Greece), Selay, Torlak(Turkey), NSC, RKS(Germany), Samho, Sekwang(Korea), Grimaldi(Italy), NIV8(UAE), Irisl(Iran)	HHIC, HMD (Korea) Desan, Selay, Torlak (Turkey) Rongsheng (China)
BC	Aktif, Active, Geden(Turkey), Billabong, Front Line(Norway), Cape, Centrofin, Safety(Greece), Da Xin Hua, Minsheng(China), D'AMICO, Deiulemar(Italy), Bocimar(Belgium), Oskar(Germany), Oceana(Swiss)	DSME, HMD, HHIC, SPP, SHI, STX (Korea) Rongsheng, New Times, Cosco Zhoushan, Daoda, Jiangsu Eastern, Jinhaiwan, STX Dailan (China) ABG (India)
PC	Barclays(UK), Hellespont, Tsakos(Greece), Interorient(Cyprus), Western Tanker(Swiss), Tanker Pacific(Singapore), Novoship(Russia), Irisl(Iran), Eships, GEM(UAE), Scorpio(USA)	DSME, HMD, SLS, STX (Korea)
Drill Ship FPSO FSRU/FSU	Golar(Norway), ETESCO, Odebrecht(Brazil), Noble Drilling Holdings(USA), Macgregor(Singapore), Irania Offshore Oil Company(Iran), Bumi Armada Berhad(Malaysia)	SHI, DSME, STX (Korea) STX Dalian (China) Keppel (Singapore)
LNGC	Cardiff, Ceres, Dynacom, Dynagas, Gaslog, Maran Gas, Thenamaris, Tsakos (Greece), Bergensen, Golar, Leif Hoegh(Norway), BG, BP, Shell(UK), Chevron(USA), Teekay(Canada), Exmar(Belgium), Pronav(Germany), QG-3, QGTC(Qatar), AP Moller(Denmark)	DSME, HHI, HHIC, HSHI, SHI, STX (Korea) MHI (Japan)
LPG	AP Moller(Denmark), Pertamina(Indonesia), Petredec(Singapore), Zodiac(UK)	HMD, HHI (Korea) Taizhou Wuzhou (China)



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