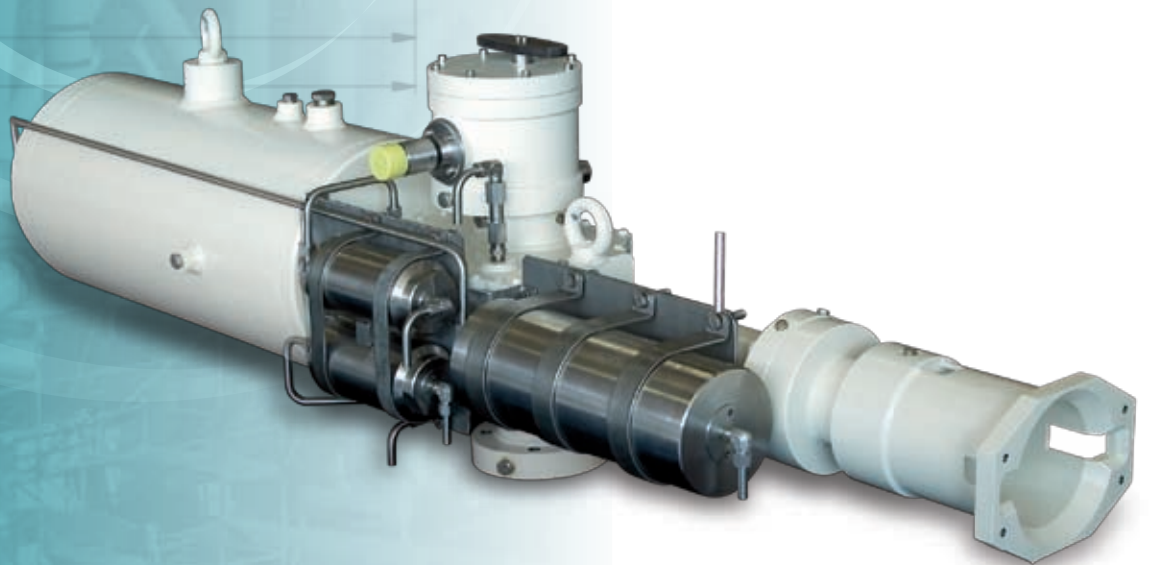


Fluid Power Actuators and Control Systems

# rotork® Fluid Systems

Established Leaders in Valve Actuation



## SUBSEA Actuation

Hydraulic Actuators  
for Subsea Service

Publication F800E Issue 10/06

## Product Overview

With an actuator installed base dating back to 1992 operating at depths ranging from 30m to over 2500m, Rotork Fluid Systems (RFS) is familiar with supplying subsea product to meet stringent subsea demands. Our qualified engineering group has worked closely with contractor and end user staff engineers to meet specific project requirements. The installed base covers pressure compensated rack & pinion, scotch yoke and linear subsea actuator designs for both double-acting and spring-return applications. The experience gained from working in conjunction with these contractors and end users has enabled us to establish a range of actuators with ROV or diver operated facilities.

Complimenting our subsea actuators is a range of subsea gearboxes with diver or ROV operable over-rides. These are designed and engineered by the dedicated gearbox manufacturers within the Rotork Gears Division. The engineering groups of Rotork Fluid Systems and Rotork Gears share databases, engineering knowledge and test facilities to provide a comprehensive subsea solution.

Our combined subsea product range encompasses designs for both retrievable and non-retrievable applications. For retrievable applications such as some SSIV requirements, the designs manufactured and supplied provide for interchangeability of the actuator with a gearbox. This is achieved using transition spools and quick release methods.

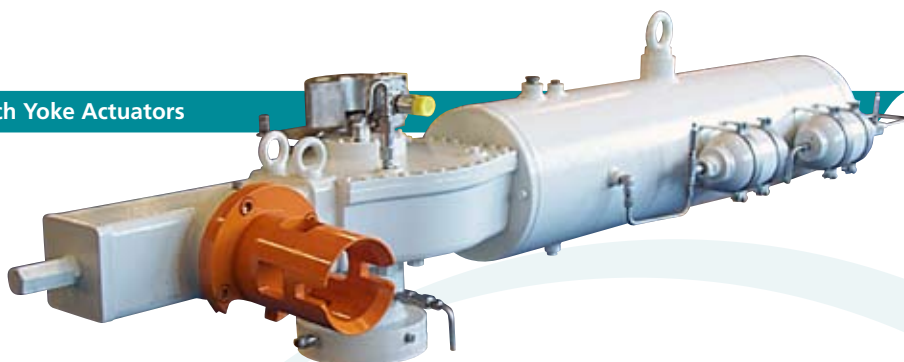
Part of the RFS subsea solution for ROV operated over-rides includes the ability to provide adjustable extensions between the ISO torque tool receptacle (bucket) and override input/drive shaft located on the actuator. This allows the receptacle to be positioned remote from the actuator to facilitate easier ROV or diver access with the tool.

Whatever the subsea valve actuation requirement, Rotork has the engineering and production expertise and experience to execute reliable and cost-effective solutions.

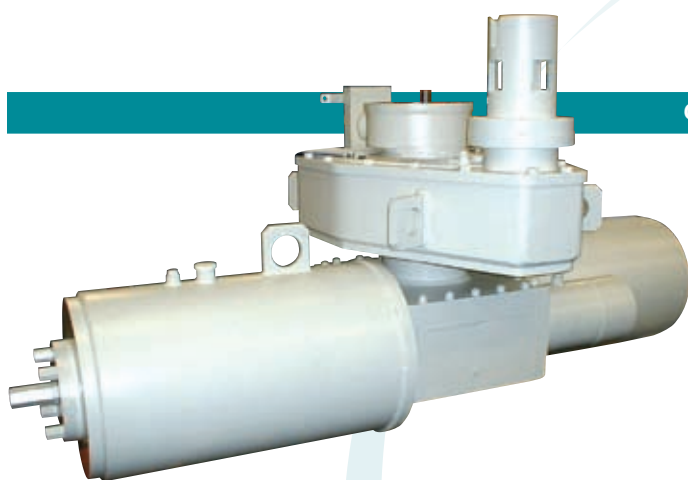


## Product Range

GSH Range – Quarter-turn Scotch Yoke Actuators



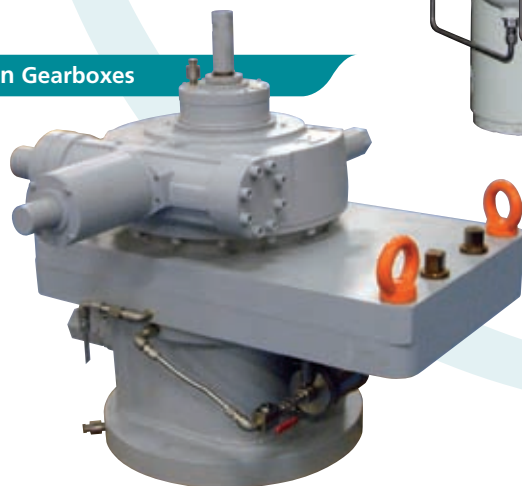
GSR Range – Quarter-turn Rack and Pinion Actuators



GSL Range – Linear Actuators



SSW Range – Quarter-turn Gearboxes

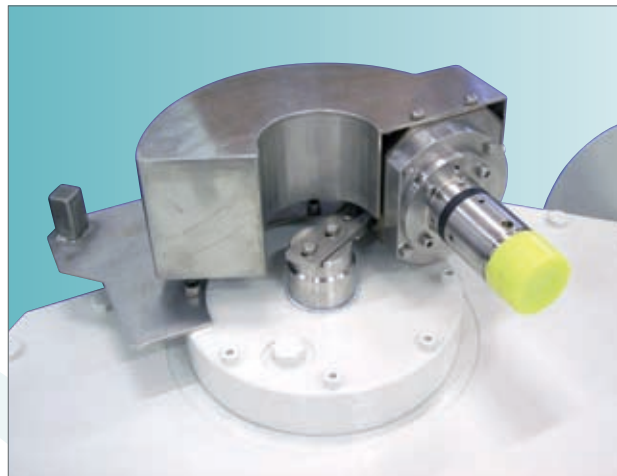


## Key Design Features

Rotork Fluid Systems' experience with subsea applications and product design extends to incorporate a variety of subsea controls items. The following is an extract of our designs, features, facilities and capabilities:

### Design Options

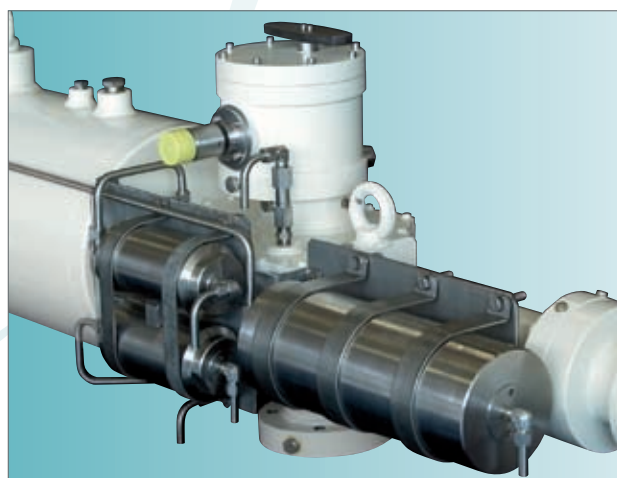
- ROV and diver operated actuator manual override via an ISO 13628-8 torque tool receptacle.
- ROV torque tool operated over-ride lock-out.
- Diver operated handwheel multiplier that inserts into the ISO receptacle for manual operation.
- Subsea gearbox for dedicated valve operation with ISO 13628-8 receptacle for ROV torque tool.
- Adjustable extensions to facilitate remote fixing of ISO receptacle.
- Remote ISO receptacle valve position indicators (showing true actuator/gearbox position via local gearbox at the remote receptacle).
- Actuator/gearbox quick release system.
- Actuator de-clutch system to allow independent operation of the actuator when on the valve.
- Actuator and gearbox declutch system to provide interchangeability between similar pipeline valves.
- Transition spool with end of stroke position stops, flushing facility, internal relief and stem cap protection.
- Double block & bleed control manifold.
- Position transducers and limit switch assemblies that allow fitting of subsea electrical connectors.
- Torque test equipment for actuator and override performance.
- ISO 4406 Class 6 (NAS 6) flushing capabilities with fluid sampling device.
- Subsea & splashzone trims.



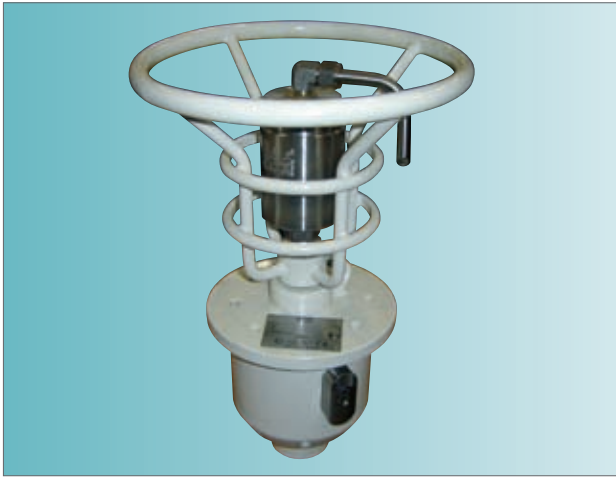
*Position transducer assembly with electrical instrumentation connector.*



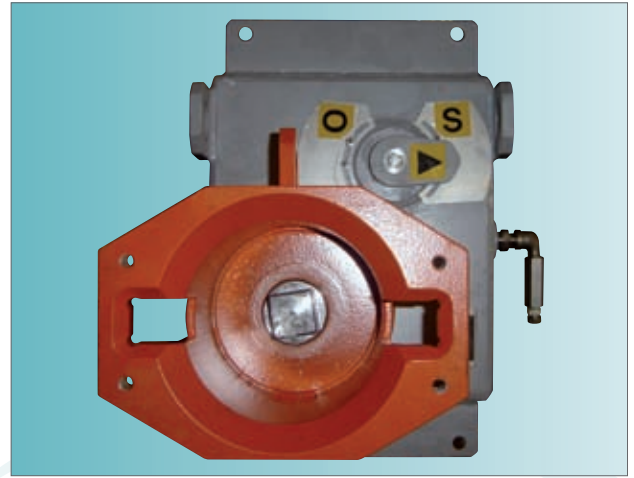
*ISO 13628-8 Class 4 ROV receptacle for rotary torque tool operation of the actuator mechanical over-ride.*



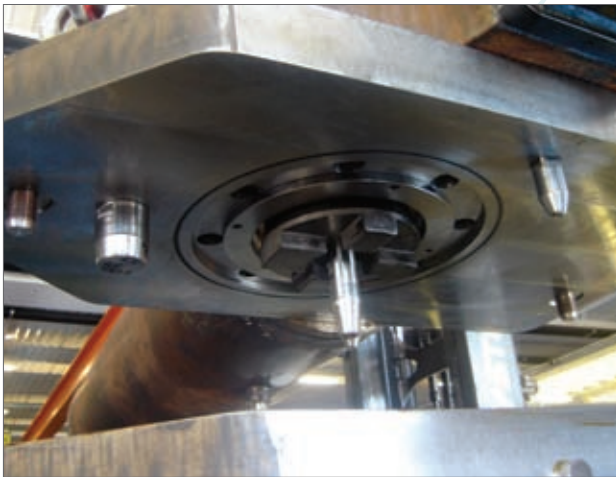
*Actuator pressure compensation system.*



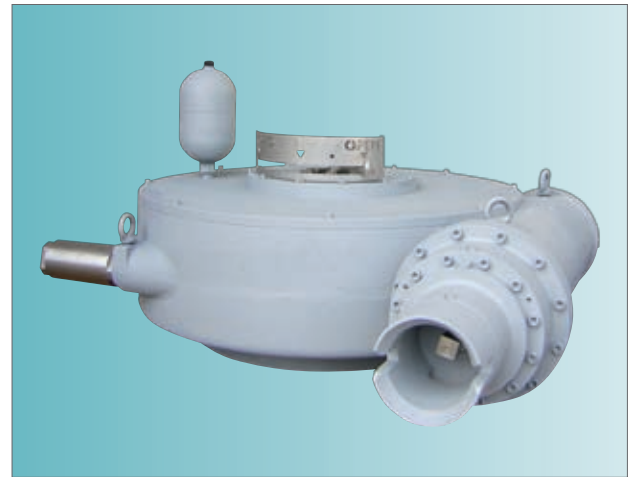
*Diver handwheel torque multiplier.*



*Remote ISO 13628-8 class 4 rotary torque tool receptacle with dedicated position indicator gearbox.*



*Actuator clutch system with locating pins.*



*Subsea worm drive gearbox.*



*Stainless steel drive extensions for remote location of ISO 13628-8 rotary torque tool receptacle.*



*Actuator trimmed for subsea & splashzone.*

# Expertise in subsea valve actuation technology

Material selection and certification of key components or assemblies is important when providing a subsea actuation solution.

We have experience providing stainless steel hydraulic cylinder assemblies, stainless steel torque tool drive extensions, inconnel overlays or inserts for the override drive and indicator drive on seawater exposed areas and, stainless steel position transducer assemblies with electrical connectors.



Viewed from 'D'

MAX PULL = 1600 KG  
AT 40° ± 2 x 100 KG

Viewed from 'B'

MAX PULL = 1600 KG  
AT 40° ± 2 x 100 KG

ACTUATOR DATA  
TOTAL ACTUATOR WEIGHT ABOVE SEA  
WITHOUT OIL = 780 KG  
WITH OIL = 1180 KG  
COMPONENT WEIGHT ABOVE SEA  
ACTUATOR: 800 KG  
SPOOL: 90 KG  
DRIVE SHAFT: 40 KG  
ROV INTERFERENCE: 80 KG  
TOTAL ACTUATOR WEIGHT  
BEAHEAD SEA (SUBSEA)  
WITHOUT OIL = 120 KG  
WITH OIL = 600 KG

ACTUATOR PERFORMANCE TABLE BY HYDRAULIC CONTROL IN MM @ 100 Bar

ITEM	VALVE TAG	100 BPS		150 BPS		200 BPS		250 BPS		VALVE WEIGHT
		Act. BPS	Act. STD	Act. BPS	Act. STD	Act. BPS	Act. STD	Act. BPS	Act. STD	
1.0	SEA-100-00010	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.1	SEA-100-00011	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.2	SEA-100-00012	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.3	SEA-100-00013	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.4	SEA-100-00014	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.5	SEA-100-00015	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.6	SEA-100-00016	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.7	SEA-100-00017	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.8	SEA-100-00018	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.9	SEA-100-00019	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.10	SEA-100-00020	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000

ACTUATOR PERFORMANCE TABLE BY ROV CONTROL IN MM @ MIN. ROV INPUT TORQUE (see Table A3)

ITEM	VALVE TAG	100 BPS		150 BPS		200 BPS		250 BPS		VALVE WEIGHT
		Act. BPS	Act. STD	Act. BPS	Act. STD	Act. BPS	Act. STD	Act. BPS	Act. STD	
1.0	SEA-100-00010	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.1	SEA-100-00011	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.2	SEA-100-00012	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.3	SEA-100-00013	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.4	SEA-100-00014	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.5	SEA-100-00015	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.6	SEA-100-00016	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.7	SEA-100-00017	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.8	SEA-100-00018	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.9	SEA-100-00019	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000
1.10	SEA-100-00020	2.110	2.400	2.110	2.400	2.110	2.400	2.110	2.400	12.000

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ROTORC FLUID SYSTEM JOB: 1  
RO. N.: AR-F321  
JOB: FF0971

**SUMMARY TABLE**

Ambient temp	10° C / + 60° C	IP rating	
Electric power supply	TBA		
Hazardous area	TBA		
Electric connections	TBA		
Supply medium	HYDRAULIC	Pressure (bar)	
Supply pressure (bar)	Min: 120	Max:	
Orientation	Line: HORIZONTAL	Valve stem:	
Coating specification	NORSOK 7		
Back up reservoir	Code: N/A	Charge:	

**Notes:** SPECIAL INTERCHANGEABLE SPOOL PRICES FOR 8" AND 10" VALVE  
MAXIMUM LIMIT SWITCHES  
ROV EXTENSIONS TO BE DETERMINED

6

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## Quality Assurance and Test

Rotork Fluid Systems is committed to providing our customers with robust and dependable products that meet or exceed their expectations. To that end, we have engineered custom test systems to ensure proper operation and functionality of our products as well as assist in our research and product development endeavors.

Our subsea actuators have successfully completed hyperbaric testing at simulated operating depths of 2,500 metres. We have been engineering and manufacturing subsea valve control solutions since 1992. A sample of the applications we have provided actuation solutions for are listed below.

### RFS Subsea Applications (abridged)

ESD (emergency shutdown) valves
Platform ESD valves - subsea, and topside
SSIV's (subsea isolation valves)
Calm buoy
FPSO (floating production, storage and offloading)
Subsea manifold systems
Subsea buoy systems
Mooring systems
Jacket flooding valves
Ballast systems





A full listing of our worldwide sales and service network is available on our website.

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**Fluid Systems**  
Fluid Power Actuators and Control Systems

**Controls**  
Electric Actuators and Control Systems

**Gears**  
Gearboxes and Gear Operators

**Site Services**  
Projects, Services and Retrofit

All Rotork Fluid Systems actuators are manufactured under a third party accredited ISO9001:2000 quality assurance programme. As we are continually developing our products, their design is subject to change without notice.

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