DYNEX
High Pressure Hydraulics

ENGINEERING SPECIFICATIONS

Electro-hydraulic Remote Proportional Actuators

SA SERIES
1200 lbs (5,33 kN) Output Force

A Remote Proportional Actuator (RPA) produces output rod displacement proportional to an electrical input signal.

The RPA can be used to remotely control variable displacement pumps and motors. It can also stroke spools of large valves, throttle controls, clutches or brakes.

COMPACT DIRECT MOUNTING

The actuator is ideal where machine size or component location make it impossible to operate a component directly.

Compact size and direct mounting makes it easy to convert existing components for remote electro-hydraulic control.

ACCURATE REMOTE CONTROL

The RPA provides accurate control without additional electronic feedback. Movement of the rod is proportional to the electrical signal, with the maximum force determined by the supply pressure.

Complex tasks can be performed with high speed and accuracy, using position sensors or microprocessor input.

These actuators feature *Mechanical Position Feedback*. This patented design monitors and controls the position of the output rod.

SPECIFICATIONS

Maximum Stroke Options

Extend or retract 0.5 inch (12,7 mm), with change in polarity;

Extend 1.0 inch (25,4 mm) or retract 1.0 inch (25,4 mm), with current increase.

Supply Pressure

Minimum, 200 psi (15 bar);
Maximum, 3000 psi (210 bar)

Output Force

60 lb (0,27 kN) at 200 psi (15 bar) supply pressure;

1200 lb (5,33 kN) at 3000 psi (210 bar) supply pressure.

ELECTRICAL DATA

Item	Specifications
Rated Voltage	± 12 VDC
Full Stroke Voltage	± 9 VDC
Rated Input Current	± 490 ma
Resistance	24,5 Ohms
Wattage	5,9 Watts
Inductance at 1,0 KHz	± 60 MH
Recommended Dither①	± 2 V, 80 Hz Square Wave
Pulse Width Modulation Frequency①	100 to 120 Hz

① *Dither not required except as noted: Actuators with 1.0 inch (25,4 mm) stroke when operated with a supply pressure below 1000 psi (70 bar), and all "High Response" models must have a dither signal superimposed on the input signal or be driven with a pulse-width modulated signal.*

Required Flow

50 in^3 (820 cm^3) per minute at 200 psi (15 bar). See performance curves on page 3.

Maximum Return Pressure

10% of supply pressure.

Seals

Fluorocarbon (Viton® or Fluorel®) seals standard. Contact the Dynex sales department for information on other seals.

How the Actuator Works

The RPA consists of a force motor, a pilot stage (with a pilot spool and pilot sleeve) and an output rod.

Pilot supply passes through an internal filter and is routed directly to the pressure chamber P_1 and through the pilot stage to the control chamber P_2.

A FORCE BALANCE IS ACHIEVED

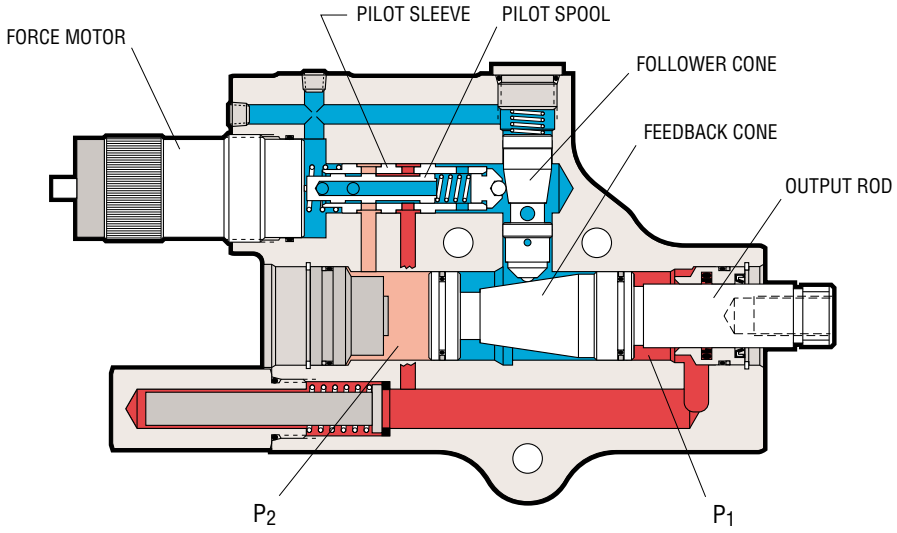
In the absence of an electrical signal, the pilot stage maintains the control pressure P_2 at a level equal to one-half of the supply pressure P_1 (assuming no load at the output rod).

Since the control chamber has an effective area A_2 twice the effective area A_1 of the pressure chamber , a force balance is achieved by the pressures acting on the output rod.

MECHANICAL POSITION FEEDBACK

The pilot spool rides within the pilot sleeve and is held in contact with the force motor armature by a spring. The pilot sleeve is held in contact with the follower cone by a spring. Likewise the follower cone is held in contact with the feedback cone on the output rod.

As the rod moves back and forth, the follower cone moves up and down forcing the pilot sleeve to move through a proportional distance.



A force balance is achieved by the pressures acting on both sides of the output rod where $A_2 = 2(A_1)$ and $P_2 = 1/2 (P_1)$

METERED FLOW MOVES ROD

The force motor moves the pilot spool in reaction to the variable electrical signal.

When the pilot spool is displaced relative to the pilot sleeve, it meters flow in or out of the control chamber causing a change in pressure P_2.

This results in unequal forces acting on the output rod (the force from pressure in the control chamber, plus any external force at the output rod, compared to the force from pressure in the pressure chamber). This imbalance causes the output rod to move.

As the output rod moves, the follower cone rides along the feedback cone moving the pilot sleeve until it realigns itself with the pilot spool.

At this point, a null condition is achieved and movement of the output rod stops. The output rod will always seek a force balance.

The result is accurate rod movement proportional to the electrical signal.

Actuator Installation And Performance

Typical Performance

See *"Performance Curves"* on page 3 for step response;

Thermal null shift:
≤1% per 100°F (40°C);

Pressure null shift:
≤3% per 1000 psi (70 bar);

Hysteresis:
≤±3% with dither, ≤±4% without dither;

Threshold:
≤2% with dither, ≤3% without dither

Fluid Recommendations

High grade premium petroleum-based oil, with a combination of anti-wear, demulsibility, rust protection, and oxidation resistance and foam resistance properties.

An RPA can be direct mounted to control the output of a variable displacement pump.

Guidelines for viscosity

Minimum, 45 SUS (6 cSt);
Maximum, 6000 SUS (1320 cSt)

Minimum Filtration Levels

10 microns nominal.

Mounting

To allow self-bleeding of air, the actuator must be mounted so the pressure port (P) is at the same level or below the return/tank port (T).

Hydro-static Transmission Applications

The actuator may be operated directly off the charge pump pressure of a hydrostatic transmission. No additional pressure supply is needed.

DIMENSIONS

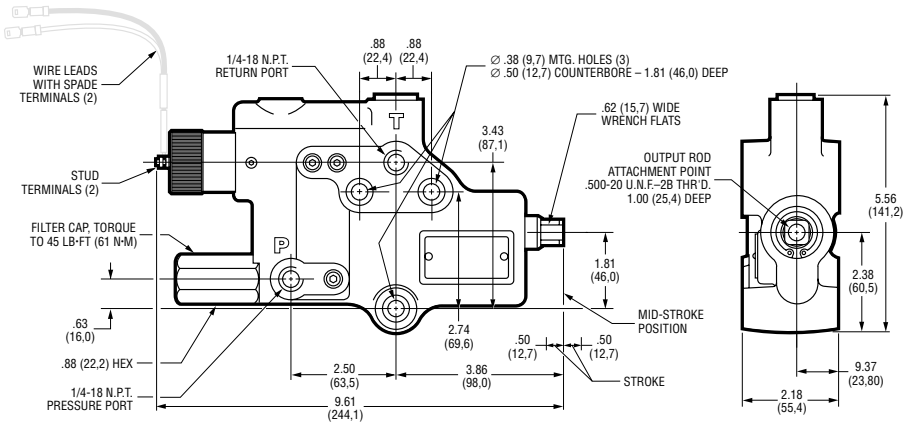
Installation drawing dimensions are shown in inches (millimeters in parentheses) and are nominal.

Terminal Configuration Options

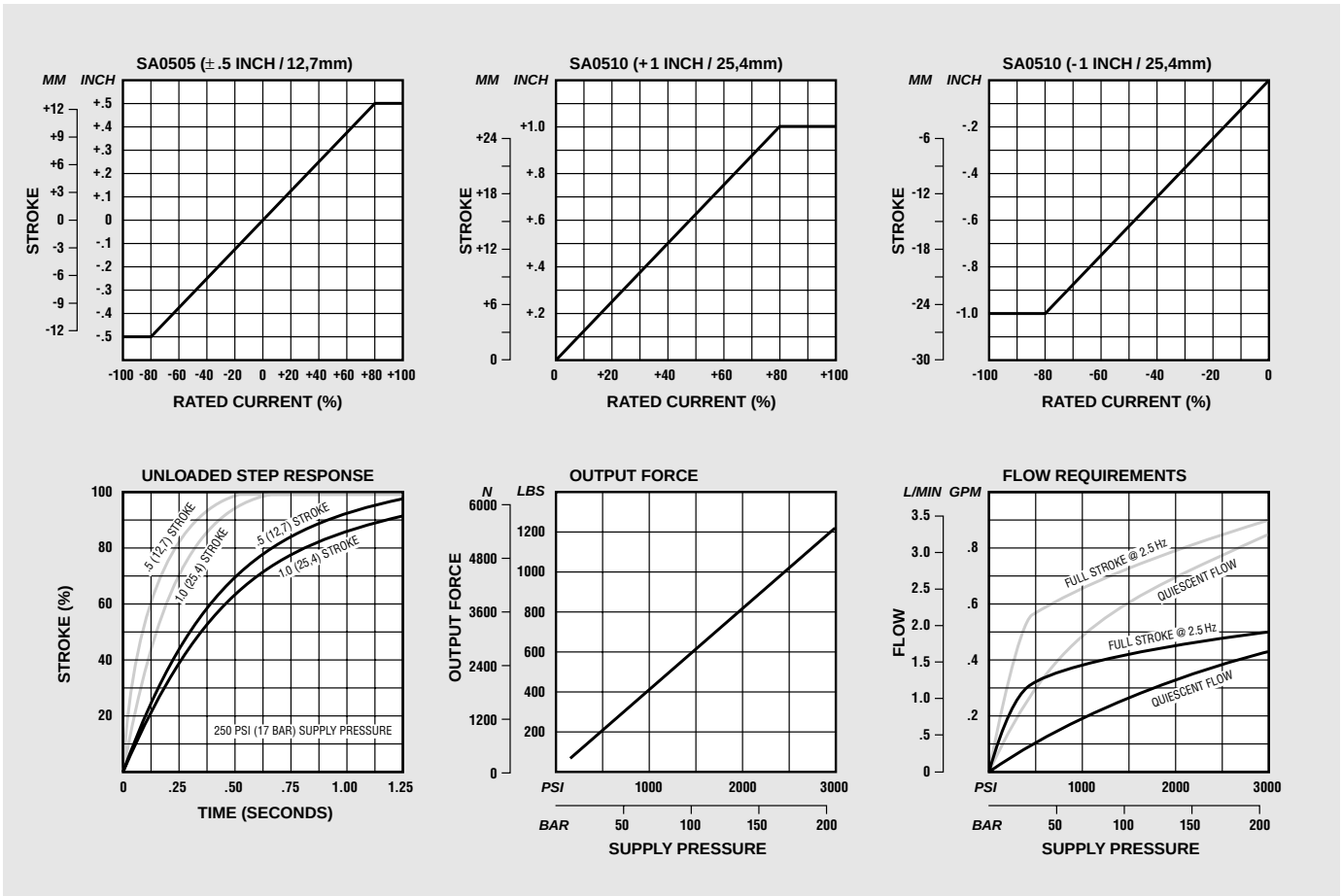
Two male stud terminals, No. 6-32 U.N.C.; 0.33 inch (8,4 mm) long;

Two wire leads with male spade terminals. Wires are approximately 6 inches (150 mm) long; Standard S.A.E. J-1128, 18 AWG Type SXL. Terminals are .250 (6,4 mm) wide x .032 (0,8 mm) thick.

See *"Typical Model Code"*, page 4.



PERFORMANCE CURVES



Performance curves for "High Response" models shown in gray. Typical curves based on 100 SUS (20 cSt) petroleum-based fluids.

Electro-hydraulic Pump Volume Control

The RPA can be used to control the output of Dynex mechanical variable delivery checkball pumps.

Kits shown below are available to mount the actuator to the pumps. These kits include a bracket and necessary hardware. The RPA must be ordered separately.

ACTUATOR MOUNTING KITS

Kit Number	Dynex Pump Series	Pump Type
KP4026-9047	PV4000	Variable Delivery
KP4020-9047	PV4000	Pressure Compensated
KP6046-9048	PV6000	Pressure Compensated

A Remote Proportional Actuator can control a Dynex mechanical variable delivery checkball pump. Output flow is controlled by stroking the spring-biased volume control stem at the back of the pump.

Typical Model Code

SA 05 05 — 03 1 0

Product Type
SA — Remote Proportional Actuator

Design
05 — Standard

Maximum Stroke
05 — ± 0.5 inch①
10 — + 1.0 inch (Extends with Voltage Increase)
15 — – 1.0 inch (Retracts with Voltage Increase)

① *Reversed voltage polarity is required for movement in both directions of the nulled center position.*

Rated Voltage
03 — 12 VDC (Single Coil, Wire Leads with Spade Terminals)
04 — 12 VDC (Single Coil, Stud Terminals)

Design Number

Modification Number
0 — Standard Response
2 — High Response

Specifications shown were in effect when published. Since errors or omissions are possible, contact your sales representative for most current specifications before ordering. Dynex reserves the right to discontinue products or change designs at any time without incurring any obligation.

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