



Norbro

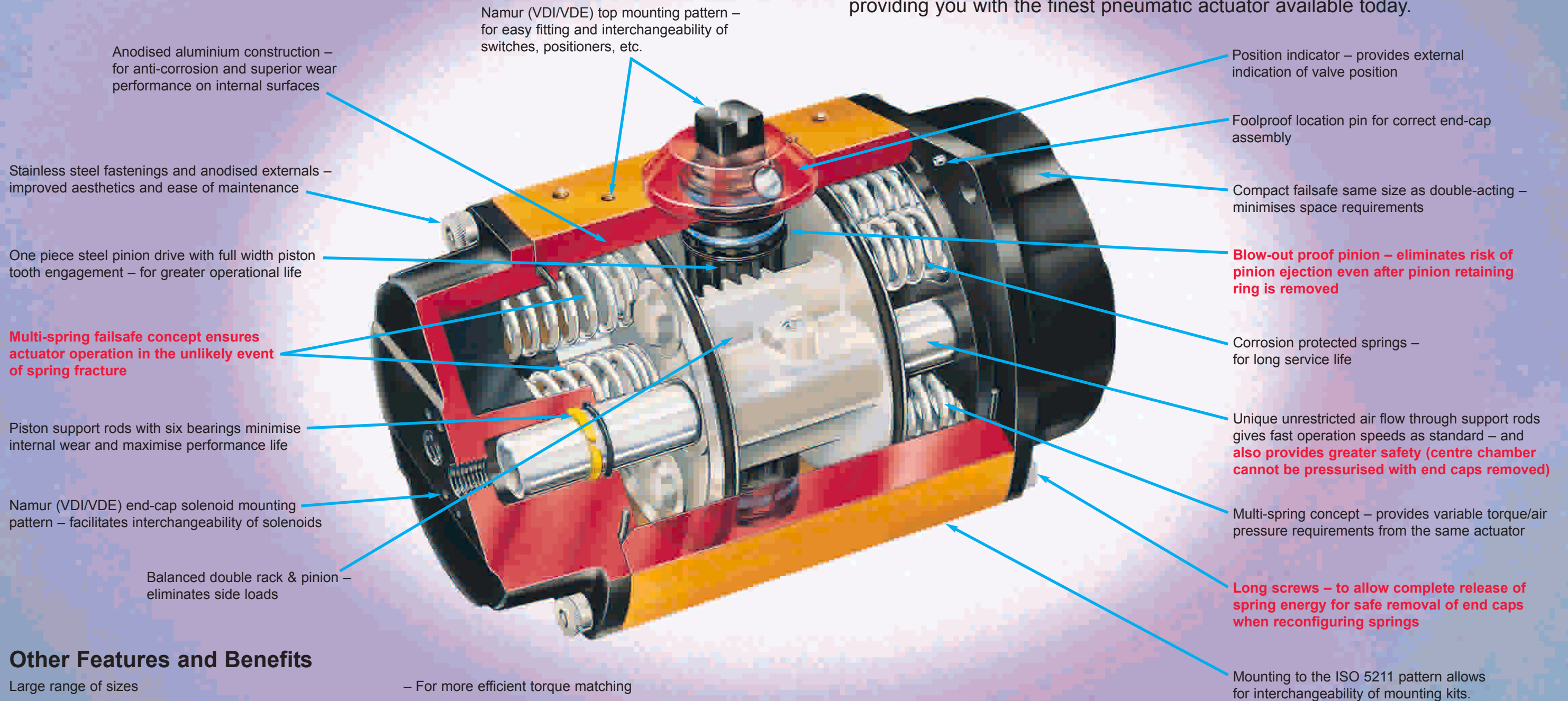
*Series 40R Pneumatic Actuator
Double Acting or Spring Return*

Since the mid-Sixties the Norbro name has been recognised as the leading quarter turn actuator for industry.

As proof of this, Norbro pneumatic actuators can be found in a range of applications as diverse as the petrochemical industry, food and beverage, steel production, pharmaceuticals and plastics manufacturing.

From the very beginning Norbro has been dedicated to providing high performance actuators which combine reliability, long life and ease of maintenance with operational **safety** and a modular design concept which allows simple attachment of a variety of ancillaries to match customer requirements.

With the latest design of the Norbro Series 40R, all of these factors add up to providing you with the finest pneumatic actuator available today.



Anodised aluminium construction – for anti-corrosion and superior wear performance on internal surfaces

Namur (VDI/VDE) top mounting pattern – for easy fitting and interchangeability of switches, positioners, etc.

Position indicator – provides external indication of valve position

Stainless steel fastenings and anodised externals – improved aesthetics and ease of maintenance

Foolproof location pin for correct end-cap assembly

One piece steel pinion drive with full width piston tooth engagement – for greater operational life

Compact failsafe same size as double-acting – minimises space requirements

Multi-spring failsafe concept ensures actuator operation in the unlikely event of spring fracture

Blow-out proof pinion – eliminates risk of pinion ejection even after pinion retaining ring is removed

Piston support rods with six bearings minimise internal wear and maximise performance life

Corrosion protected springs – for long service life

Namur (VDI/VDE) end-cap solenoid mounting pattern – facilitates interchangeability of solenoids

Unique unrestricted air flow through support rods gives fast operation speeds as standard – and **also provides greater safety (centre chamber cannot be pressurised with end caps removed)**

Balanced double rack & pinion – eliminates side loads

Multi-spring concept – provides variable torque/air pressure requirements from the same actuator

Long screws – to allow complete release of spring energy for safe removal of end caps when reconfiguring springs

Mounting to the ISO 5211 pattern allows for interchangeability of mounting kits.

Other Features and Benefits

Large range of sizes

Failsafe operation in a fire

Option for reversible direction of operation

No special tools required for maintenance

Standard operating temperature range of -20°C to +100°C

All parts sealed and greased for life

– For more efficient torque matching

– Polished support rods retain fire-safe capability even if bearings are fire damaged

– For failsafe open capability on butterfly valves

– Simple to maintain

– Increased applications

– No lubricated air supply required

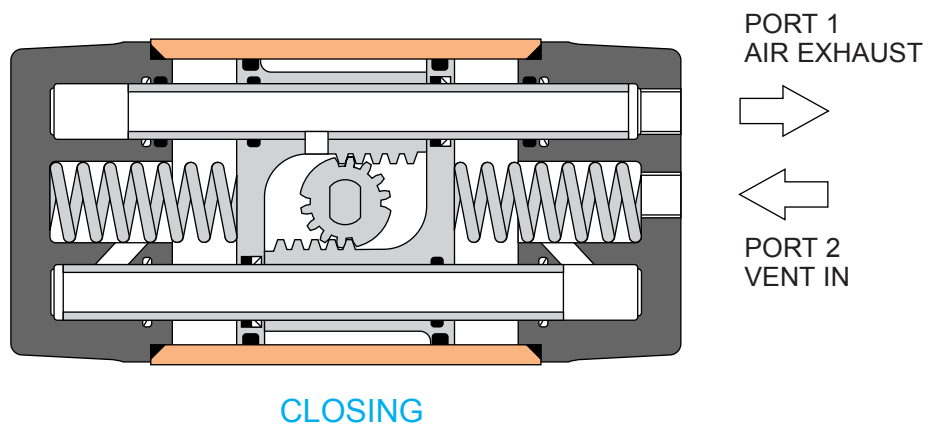
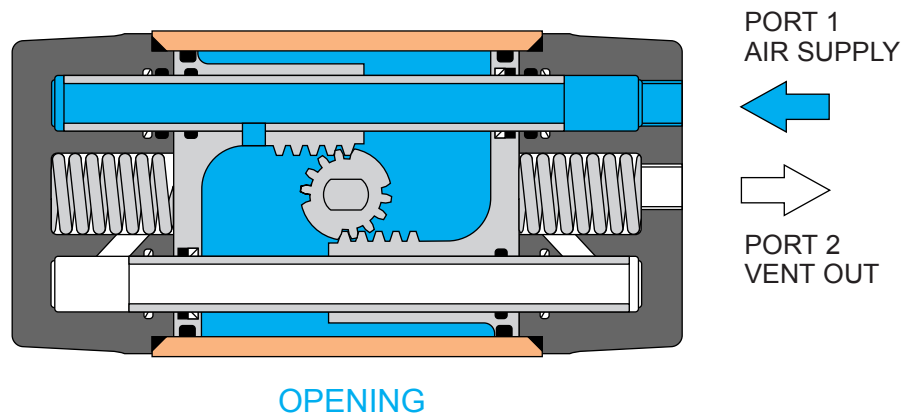
Operating Principle

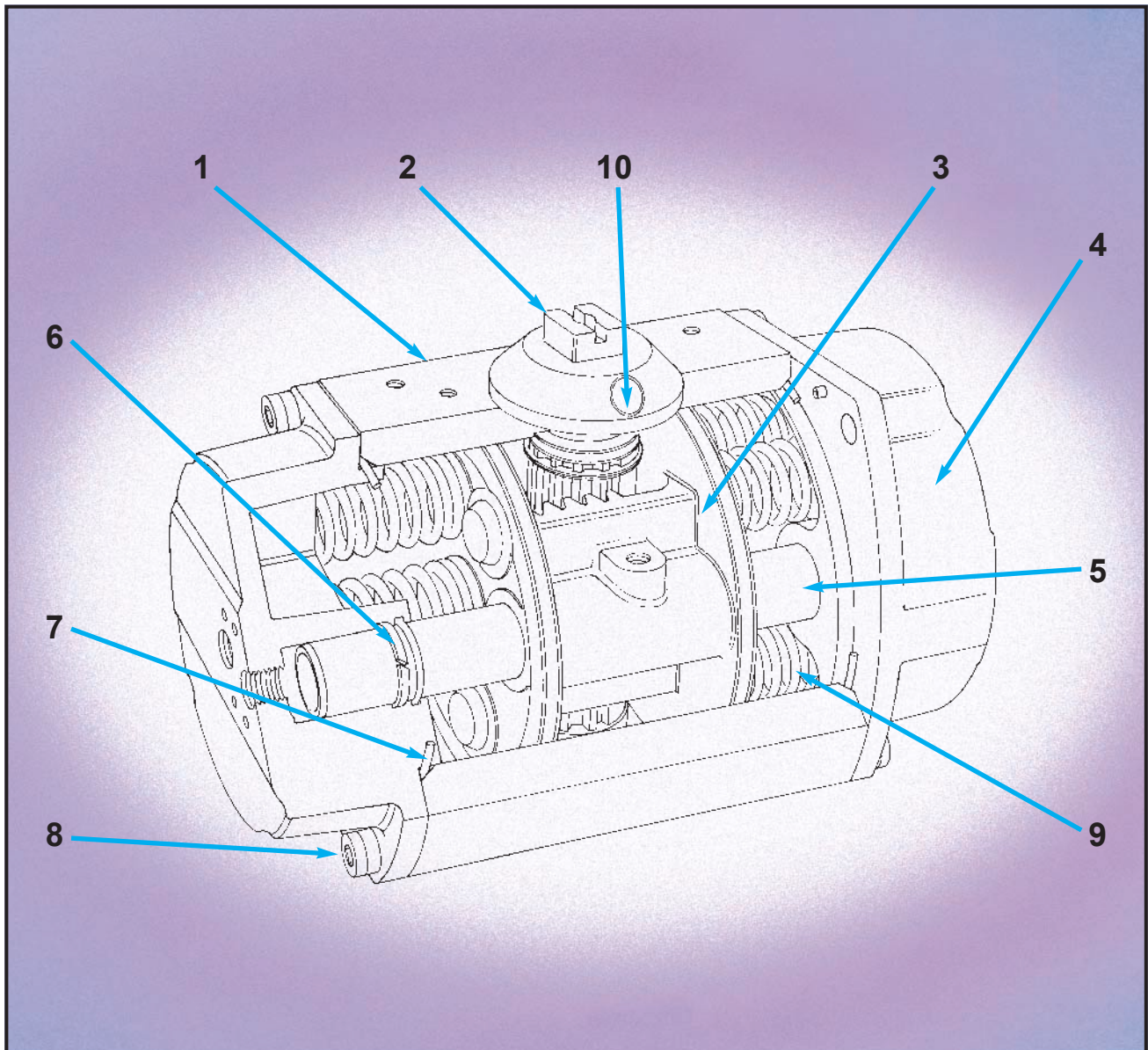
The Norbro 40R pneumatic actuator is based on the opposed double rack and pinion principle utilising piston support rods to minimise friction and wear between pistons and body bore.

In the double acting model, compressed air is applied to Port 1 which is fed via the large bore support rod into the centre chamber. This forces the pistons apart and turns the actuator's output drive anti-clockwise (seen from above) for valve opening, simultaneously venting the air in the end chamber via the second support rod through Port 2. This operation can then be reversed by supplying air into Port 2 for clockwise rotation (valve closing).

With the fail-safe spring return model, air is applied in a similar way to Port 1 for anti-clockwise operation (valve opening) and this position will be maintained until air pressure is released when spring force closes the pistons together for clockwise operation (valve closing).

NOTE: With the size 05 actuator, air is supplied and vented through the body of the actuator as its compact size makes the use of support rods impractical.





Parts List / Materials Specification

Item No.	Description	Material/Finish
1	Body	Aluminium (Extrusion) Anodised
2	Pinion	Carbon Steel (Corrosion Resistant Coated)
3	Pistons	Aluminium
4	End Caps	Aluminium Anodised
5	Support Rods	Stainless Steel
6	Bearings	Acetal
7	'O' Rings	Nitrile Rubber
8	End Cap Screws	Stainless Steel
9	Springs	Chrome Silicon Steel (Corrosion Resistant Coated)
10	Position Indicator	Polyethylene

Actuator sizing

There are twelve sizes of Norbro double acting or fail safe spring return pneumatic actuators providing a torque range of 11 to 4617 Nm (at an operating pressure of 5.5 bar). This enables efficient and therefore economical torque matching.

The torque tables detailed below provide actual torque values for the range of actuators at typical pressure and spring configurations.

When sizing a valve, we recommend that a factor of safety is applied to its nominal torque.

Alternatively, for more comprehensive sizing calculations, the Norbro/Worcester Actuator/Valve sizing program should be used (available on request).

Torque output (Nm) – Double Acting Actuator

Size-Series	OPERATING PRESSURE (bar)										
	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0
05-40R				7	8	9.1	10.2	11.2	12.3	14.4	
10-40R	10.4	13.4	16.3	19.3	22.3	25.2	28.2	31.1	34.1	40	46
15-40R	19.9	25.6	31.3	37	42.7	48.5	54.1	59.8	65.5	77	88.3
20-40R	36.5	46.9	57.4	67.7	78.2	88.7	99.1	109	120	141	162
25-40R	60.9	78.3	95.7	113	131	148	165	183	200	235	270
30-40R	100	129	157	186	214	243	272	300	329	386	443
33-40R	196	252	308	363	419	475	531	587	643	755	867
35-40R	240	309	377	446	515	583	652	720	789	926	1063
40-40R	383	492	602	711	821	931	1040	1149	1259	1478	1697
42-40R	665	854	1044	1234	1424	1615	1804	1993	2184	2564	2943
45-40	995	1280	1564	1847	2133	2418	2701	2984	3270	3840	4407
50-40	1539	1979	2419	2858	3299	3740	4179	4617	5058	5940	6818

Torque Output (Nm) – Spring Return Actuator

Size-Series	Number of Springs	Spring Torque		OPERATING PRESSURE (bar)																		
				2.5		3.0		3.5		4.0		4.5		5.0		5.5		6.0		7.0		
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	
05-40R	2*	4.7	3.6					3.2	1.9	4.1	2.8	5.1	3.7	6.1	4.6							
	4	6	4.6											5.1	3.4	6	4.2	7	5.1			
10-40R	4	7.9	4.7	9.2	5.7	11.7	8.3															
	6	11.9	7.1			9.6	4.5	12.4	7.2	15.2	9.8											
	8	15.8	9.5							12.8	6.1	15.6	8.7	18.4	11.3							
	10	19.8	11.8											16	7.6	18.8	10.2	21.6	12.8	27.1	18.1	
15-40R	4	13	8.4	18.3	12.9	23.7	18															
	6	19.5	12.6			19.5	11.8	24.8	16.9	30.1	21.9											
	8	26.1	16.8							25.9	15.8	31.3	20.8	36.6	25.8							
	10	32.6	21											32.5	19.7	37.8	24.8	43.1	29.8	53.8	39.9	
20-40R	4	23.7	15.3	33.6	23.8	43.3	33															
	6	35.6	23.9			35.7	21.8	45.4	31	55.2	40.3											
	8	47.4	30.7							47.5	29.1	57.3	38.3	67.1	47.5							
	10	59.3	38.3											49.7	27.1	59.4	36.3	69.2	45.6	79	54.8	98.5
25-40R	4	42.8	26.2	55.4	36.7	71.7	52															
	6	64.2	39.3			58.6	31.9	74.9	47.3	91.2	62.7											
	8	85.6	52.5							78.1	42.5	94.4	57.9	111	73.3							
	10	107	65.6											97.6	53.1	114	68.5	130	83.9	163	115	
30-40R	4	68.8	42	91.9	61.5	119	86.8															
	6	103	63.1			97.7	54.4	125	79.7	151	105											
	8	138	84.1							130	72.5	157	97.8	184	123							
	10	172	105											163	90.6	190	116	217	141	270	192	
33-40R	4	142	90.8	171	113	224	163															
	6	213	136			178	95.6	231	145	283	195											
	8	284	182							238	127	290	177	343	226							
	10	356	227											297	159	350	209	402	258	510	357	
35-40R	4	164	105	217	149	281	210															
	6	246	158			228	132	293	193	357	254											
	8	328	210							304	176	369	237	433	298							
	10	410	263											381	220	445	281	509	342	638	463	
40-40R	4	281	169	345	219	447	316															
	6	421	253			363	184	465	281	568	377											
	8	562	337							483	245	586	342	689	439							
	10	702	422											604	306	707	403	810	500	1015	694	
42-40R	4	496	293	598	372	776	540															
	6	744	439			629	306	807	474	985	642											
	8	992	585							839	408	1017	576	1195	744							
	10	1240	731											1049	510	1227	678	1404	846	1761	1182	
45-40	8	690	357	976	607	1242	859															
	12	1035	535			1064	532	1330	785													
	16	1380	714					1152	459	1419	711	1685	962									
	20	1725	892									1507	636	1773	888	2040	1140					
	24	2070	1071											1595	562	1861	814	2128	1066	2661	1569	
50-40	8	1090	552	1510	918	1923	1307															
	12	1635	827	1235	403	1647	793	2059	1182													
	16	2180	1103					1783	667	2196	1057	2608	1446									
	20	2725	1379									2332	931	2745	1321	3157	1710					
	24	3270	1654											2469	806	2881	1196	3294	1585	4119	2364	

*When using one spring per end-cap, the larger outer spring should be used.

Air pressure below 5.5 bar will not normally be sufficient to compress the full set of springs in each end cap. For lower air pressures the number of springs must, therefore, be adjusted. (IMPORTANT: Refer to Norbro 'Installation, Operating and Maintenance Manual' or to our Sales Office for details.)

Operating Conditions

Pressure Limitation	8.3 bar Maximum. For higher pressures contact our sales office.	Travel (all sizes)	Average 92° total travel including nominal 1° overtravel both clockwise and anti-clockwise.
Media	Air or non-corrosive fluid	Extended travel option	180°, 120° - Series 33. For further options consult the Sales Office.
Temperature range	Standard -20°C to +100°C Low temperature variant -40°C to +85°C High temperature variant -20°C to +150°C	Adjustable travel stop	Option available to adjust actuator stroke through 20° from each end of travel.
Rotation (viewed from the top)	Pinion rotates anti-clockwise when the centre chamber supply port (RHS) is pressurised (see Page 4)	Hydraulic operation	Complete range available for operation with hydraulic fluids at pressure, temperature and torque conditions corresponding to normal air supply.

Operating Speeds (Seconds) – Actuator with no load – using Solenoid Control Valve – 5.5 bar

Size-Series	05-40R	10-40R	15-40R	20-40R	25-40R	30-40R	33-40R	35-40R	40-40R	42-40R	45-40	50-40
Double Acting open and close	0.2	0.2	0.3	0.4	0.7	1.0	2.1	2.4	3.7	6.0	7.0	12.0
Spring return spring stroke (Closed)	0.1	0.2	0.3	0.5	0.6	1.1	2.1	2.6	4.1	7.2	9.0	15.0
Spring return air stroke (Open)	0.1	0.2	0.3	0.5	1.0	1.2	2.5	2.8	4.9	8.9	12.0	21.0

Speeds other than those given above are obtainable if required by using additional control equipment.

Note: These times for the actuator are typical and can vary under actual operating conditions. They are given as a guide only.

Air Consumption per stroke – Actual Volume – Litres

Size-Series	05-40R	10-40R	15-40R	20-40R	25-40R	30-40R	33-40R	35-40R	40-40R	42-40R	45-40	50-40
Anti-Clockwise	0.05	0.17	0.35	0.69	1.22	1.86	3.39	3.93	6.73	12.0	13.51	23.87
Clockwise (D.A. only)	0.05	0.22	0.39	0.74	1.31	2.05	4.79	5.54	8.19	13.89	20.0	30.5

To obtain Free Air Displacement (FAD) Volume, multiply actual volumes by absolute working pressure (bar A).

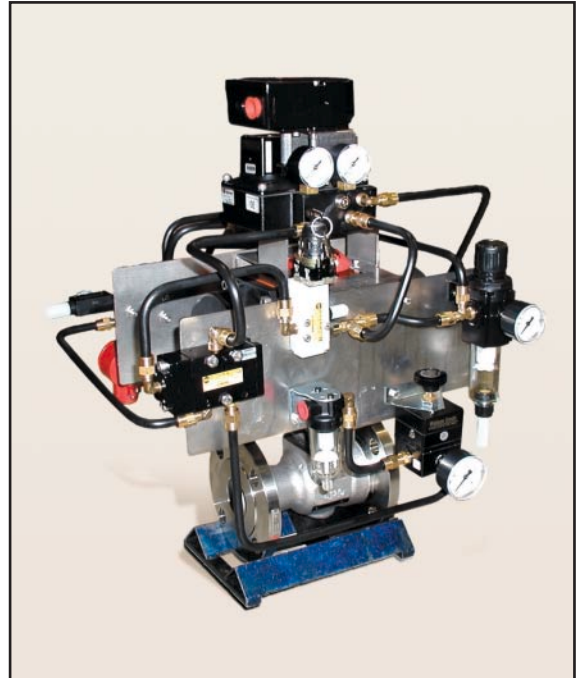
Weight – Kgs

Size-Series	05-40R	10-40R	15-40R	20-40R	25-40R	30-40R	33-40R	35-40R	40-40R	42-40R	45-40	50-40
Double Acting	0.7	1.3	2.7	4.5	7.4	11.0	22.5	26.0	43.6	71.8	97.0	138.0
Spring Return	0.8	1.6	3.1	5.5	8.4	12.0	26.0	30.0	48.6	80.6	115.0	161.0

Accessories and options



Worcester's V-Flow control valve incorporating the 40R actuator provides precise and flexible performance when modulating flow. Further information on this product is available on request.



A wide range of ancillary equipment can be fitted to meet the most exacting customer requirements. This is an area where Worcester has considerable experience and we would be pleased to discuss any process problems.



- **Geared Override**

A retro fittable gearbox is available for manual operation of the valve when power is lost.

- **Fast Acting**

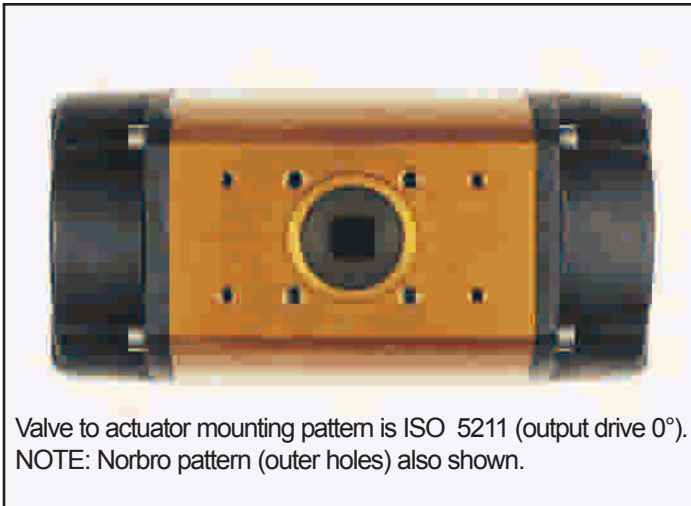
Modifications for quicker opening/closing speeds.

- **Protective Coatings**

Various coatings (eg Epoxy, PVC, etc.) are available for marine, hygienic and spark inhibition applications.

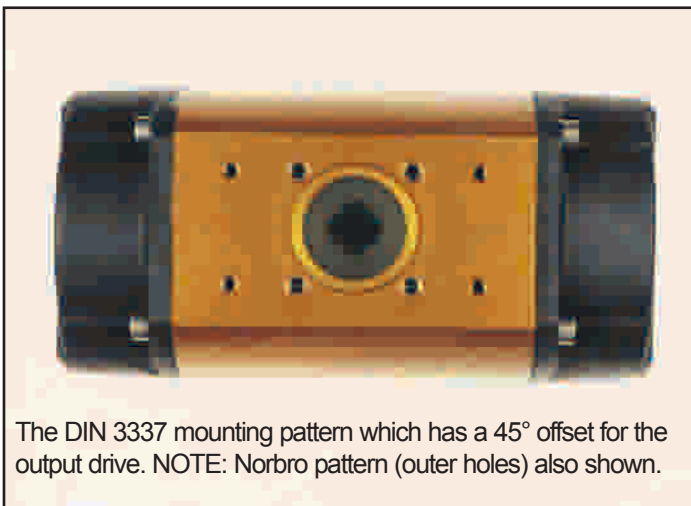
Mounting Configurations (all dimensions in mm)

ACTUATOR / VALVE INTERFACE



ISO 5211

Size-Series	ISO 5211
05-40R	F03 x 9.00 sq
10-40R	F04 x 11.10 sq
15-40R	F05 x 14.27 sq
20-40R	F07 x 14.27 sq
25-40R	F07 x 19.05 sq
30-40R	F10 x 19.05 sq
33-40R	F12 x 25.40 sq
35-40R	F12 x 25.40 sq
40-40R	F14 x 28.57 sq
42-40R	F16 x 46.00 sq
45-40	Norbro x 44.45 sq
50-40	Norbro x 44.45 sq

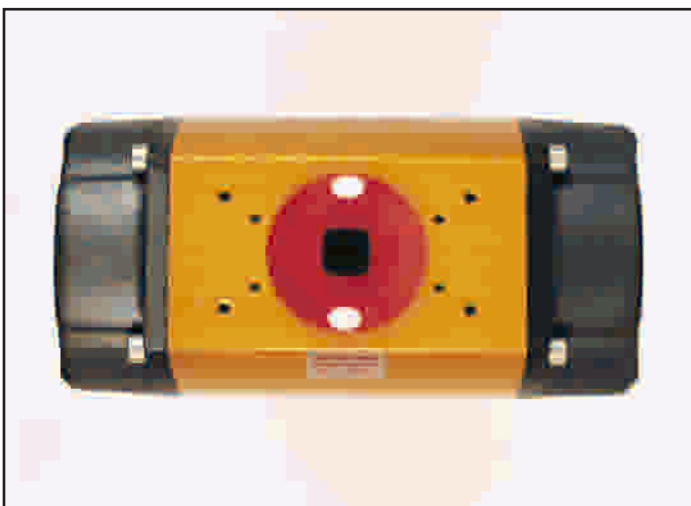


DIN 3337

Size-Series	DIN 3337
05-40R	F03 x 9.00 sq
10-40R	F04 x 11.00 sq
15-40R	F05 x 14.00 sq
20-40R	F07 x 17.00 sq
25-40R	F07 x 17.00 sq
30-40R	F10 x 22.00 sq
33-40R	F12 x 27.00 sq
35-40R	F12 x 27.00 sq
40-40R	F14 x 36.00 sq
42-40R	F16 x 46.00 sq
45-40	F16 x 46.00 sq
50-40	F25 x 55.00 sq



TOP MOUNT INTERFACE



Namur (VDI/VDE 3845) mounting configuration facilitates the fitting and interchangeability of all types of top-mounted ancillaries.



Size-Series	Pitch - Height
05-40R	–
10-40R	80 x 30 - 20 H
15-40R	80 x 30 - 20 H
20-40R	80 x 30 - 20 H
25-40R	80 x 30 - 30 H
30-40R	80 x 30 - 30 H
33-40R	80 x 30 - 30 H
35-40R	80 x 30 - 30 H
40-40R	130 x 30 - 50 H
42-40R	130 x 30 - 50 H
45-40	130 x 30 - 50 H
50-40	130 x 30 - 50 H

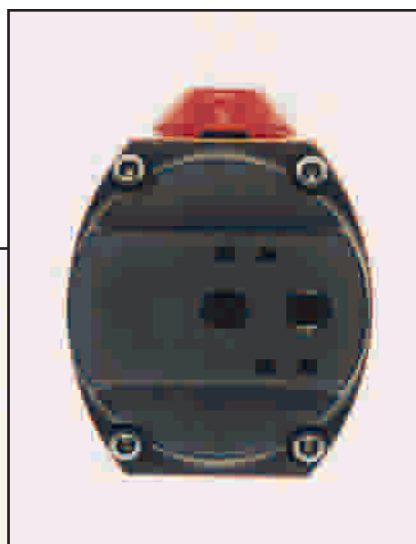
END MOUNT ACCESSORIES



Norbro's unique end-mounted J-switch enclosure is suitable for any standard 40R actuator (except size 05).



Namur (VDI/VDE 3845 pattern) interface allows direct end-mounting of solenoids (all ports are G¹/₄ except size 05 and 10 which are G¹/₈).



OUTLINE SPECIFICATIONS (For detailed information refer to General Arrangement drawings, available from Sales Office)

Size-Series	Torque @ 5.5 bar		Envelope Dimensions			
	Double Acting Nm	End of Spring Nm	Length mm	Height mm	Width mm	Weight kg
05-40R	11	5	138*	70	67	0.8
10-40R	31	12	155	106	77	1.6
15-40R	60	21	194	124	94	3.1
20-40R	109	38	235	145	116	5.5
25-40R	183	66	270	177	136	8.4
30-40R	300	105	325	198	155	12.0
33-40R	587	227	397	244	206	26.0
35-40R	720	263	422	247	213	30.0
40-40R	1149	422	508	326	245	48.6
42-40R	1993	731	616	366	283	80.6
45-40	2984	1071	576	424	335	115.0
50-40	4617	1654	626	474	388	161.0

* Spring return version – double acting length is 106mm.

Basic information on Norbro pneumatic actuators

(For full explanation of product code, refer to Worcester Spec No. 300034 Section F)

Size (First 2 digits of full product code)		Number of Springs	
05	(40R)	A = 0	} (6th digit of full product code)
10		B = 4	
15		F = 2	
20	(40R)	A = 0	
25		B = 10	
30		C = 8	
33		D = 6	
35		E = 4	
40	(40)	A = 0	} (Digits 19 & 20 of full product code)
42		B = 24	
45		P1 = 20	
50	P2 = 16		
	P4 = 12		
		P3 = 8	

Variants



Norbro's Series 61 two-stage actuator is designed for drum filling applications.



The Series 33 180° actuator provides the perfect solution for Worcester's range of multi-ported valves.