

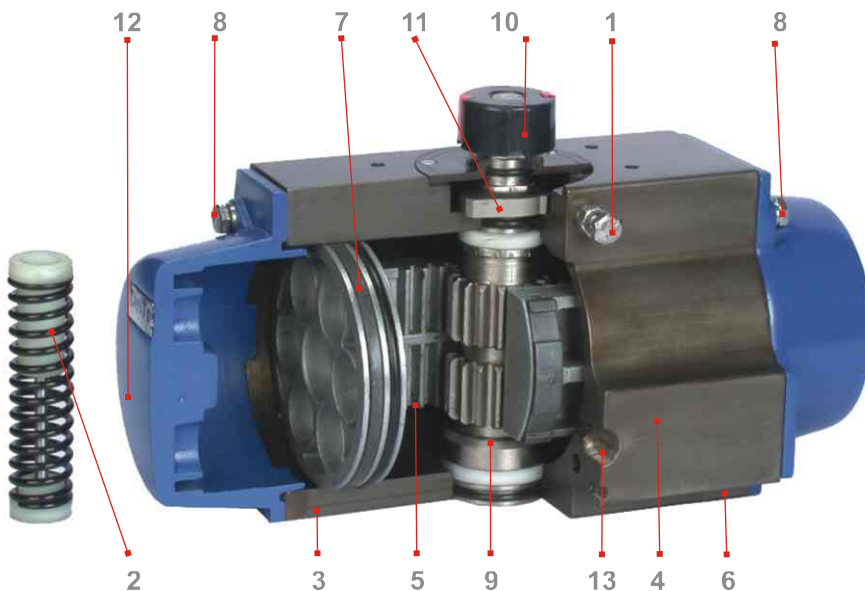


Deltorq **SERIES 20**
 Pneumatic Rack & Pinion Actuators

Double Acting and
 Spring Return

Features

Virgo Engineers Limited is pleased to offer top of the line products in flow control automation. The **DelTorq** Series 20 are pneumatically operated, quarter turn rotary, dual rack and pinion design actuators. These actuators are built with several of the latest features that enhance safety and performance. The actuators are manufactured in modern plants, equipped with state of the art machinery and under a robust quality assurance system complying to ISO 9001 and PED 97/23/EC. Listed in this catalog are the features and benefits of **DelTorq** actuators. Also included is the comprehensive technical data, which can be useful for selecting the correct **DelTorq** actuator.



1 Two independent external travel stops permit easy and precise adjustment of $\pm 5^\circ$ in both directions. Adjustment screws do not penetrate the pressurized body and eliminates possible leakage.

2 Modular pre-loaded spring cartridges for safe, efficient use of actuator. Convert a double acting actuator to a spring return actuator by simply removing the end caps and adding from 2-6 spring cartridges each side to accomplish the desired torque. Spring cartridges have corrosion resistant springs.

3 Hard anodized extruded aluminum body with honed internal surface for strength and lower coefficient of friction. This ensures extended service life and low maintenance down-times. The air passages are machined internally to avoid external tubing. The external shape is contoured and rounded to avoid buildup of contaminants.

4 Compact modular design with same body and end caps for double acting and spring return design. Combined with an adapter sleeve design to offer the most efficient use of inventory.

5 Dual rack and pinion design for compact construction, high cycle life, symmetrical mounting position, fast and efficient operation and offers both spring-to-open and spring-to-close option. Reverse rotation can be accomplished in the field by simply inverting the pistons.

6 Wide actuator base design option can be adapted to mount to valve designs requiring wider than ISO 5211 drilling. This feature coupled with the unique shaft design can be customized to fit your specific requirements.

7 Top quality bearings and seals for low friction, high cycle life, to ensure trouble free operation.

8 Internal and external stainless steel fasteners and specially coated springs provide corrosion resistance in a variety of environments and applications.

9 The unique manufacturing technique of the shaft combines a high strength alloy steel shaft, having precision machined gear teeth with a precision drive end available in parallel square, diagonal square and double "D" output configurations. The guide bar in the piston provides an inherent blow out proof shaft design.

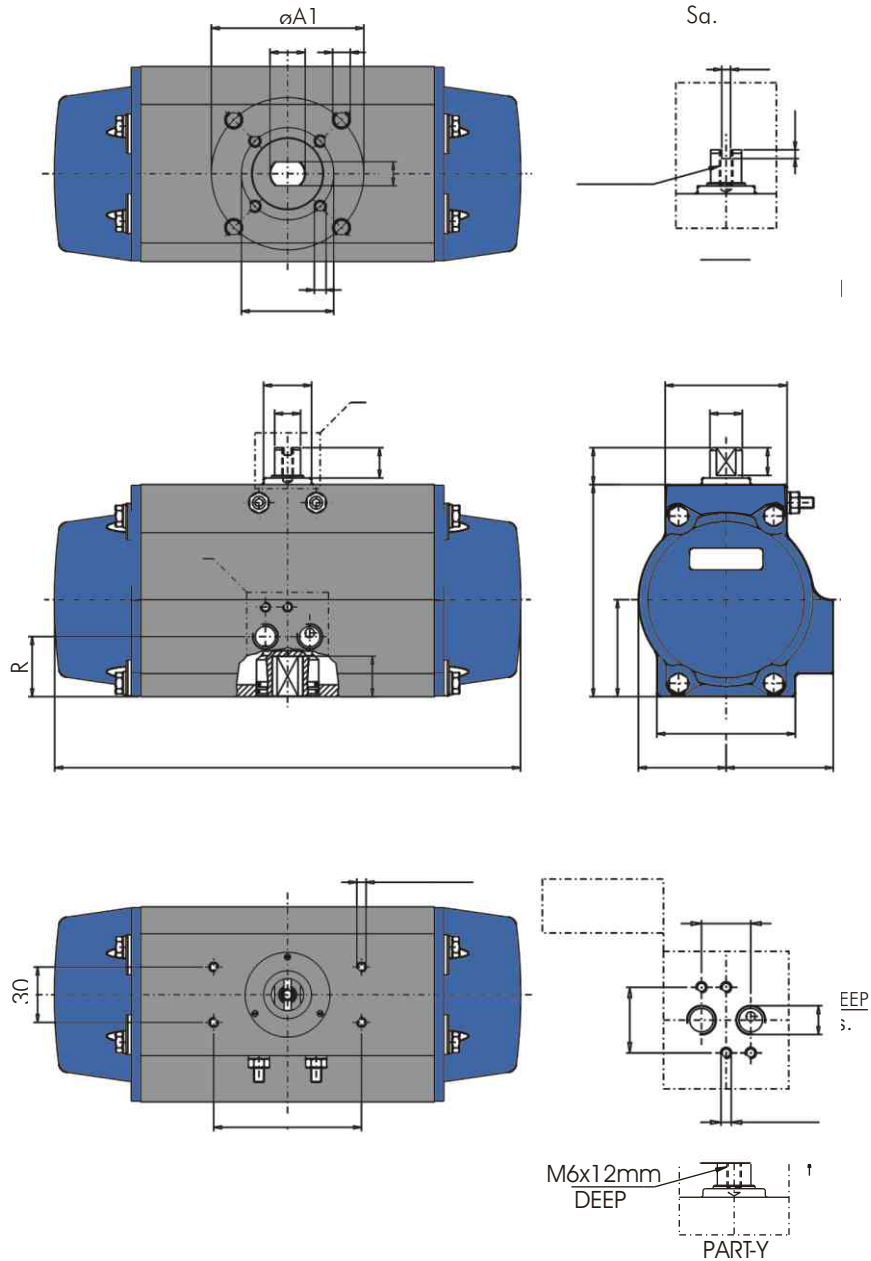
10 Unique position indicator can be indexed to show alternate position. Top of actuator shaft has a Namur slot to drive all popular sensors and positioners.

11 The design of the stop adjustment cam permits the actuator to be locked out in the full open or full closed position before performing mechanical maintenance work. A special lock out enclosure is also available as an option to prevent unwanted operation.

12 Standard end caps are rounded with no crevices to accumulate contamination or corrosive chemicals. Optional end caps are available to provide 100% stroke adjustment in one direction. The external and internal surface is coated with an epoxy based powder to provide resistance to atmospheric corrosion and general resistance to mild chemicals.

13 Manufactured in full compliance with the latest requirements of ISO 5211 and EN12116. Provisions for mounting solenoid valves and accessories comply with Namur VDI/VDE 3845.

Engineering

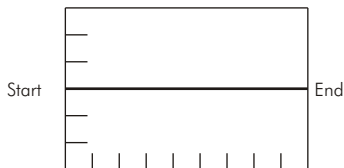


Dimensions (mm)

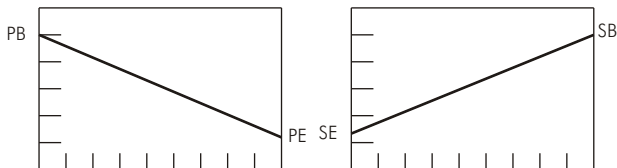
| Size | ϕA | $\phi A1$ | B | B1 | C | D | E | F | G | H | J | ϕK | L | M | M1 | ϕN | P | Q (NPT) | R | S | T | U | V | Sq. (Max) | W |
|------|----------|-----------|--------|--------|------|-----|------|------|------|-------|-------|----------|----|------|----|----------|-----|------------|------|----|----|----|------|--------------|----|
| 052 | 42 | 70 | M5x8 | M8x8 | 46 | 63 | 30 | 40 | 36.6 | 79.1 | 147.5 | 10 | 8 | 12.5 | 14 | 17 | 80 | 1/8 | 25 | 20 | 14 | 10 | 32.5 | 11 | 14 |
| 065 | 50 | 70 | M6x8 | M8x10 | 58 | 63 | 36.5 | 48 | 44 | 94.7 | 184 | 14 | 10 | 12.5 | 14 | 26.5 | 80 | 1/4 | 28 | 20 | 14 | 10 | 32.5 | 14 | 18 |
| 075 | 50 | 70 | M6x8 | M8x10 | 58 | 63 | 41.5 | 52 | 50.6 | 107.3 | 205 | 14 | 10 | 12.5 | 14 | 26.5 | 80 | 1/4 | 30.6 | 20 | 19 | 13 | 32.5 | 17 | 20 |
| 085 | 50 | 70 | M6x8 | M8x10 | 66 | 75 | 47.5 | 58 | 52.5 | 114.8 | 253 | 17.5 | 14 | 12.5 | 14 | 26.5 | 80 | 1/4 | 32.5 | 20 | 19 | 13 | 32.5 | 17 | 20 |
| 100 | 70 | 102 | M8x10 | M10x12 | 74 | 88 | 55 | 67 | 62 | 137.8 | 260 | 17.5 | 14 | 12.5 | 14 | 26.5 | 80 | 1/4 | 39.5 | 20 | 22 | 16 | 32.5 | 22 | 25 |
| 115 | 70 | 125 | M8x10 | M12x12 | 86.5 | 110 | 63 | 77.5 | 71.3 | 158.3 | 310 | 26 | 20 | 20 | 22 | 35 | 130 | 1/4 | 48.8 | 30 | 22 | 16 | 32.5 | 22 | 25 |
| 125 | 70 | 125 | M8x10 | M12x12 | 96.5 | 110 | 68 | 82.5 | 76.3 | 172.6 | 368 | 26 | 20 | 20 | 22 | 35 | 130 | 1/4 | 53.8 | 30 | 22 | 16 | 54 | 22 | 27 |
| 160 | 125 | 165 | M12x12 | M20x25 | 121 | 150 | 87.5 | 108 | 99 | 217.5 | 472 | 35 | 27 | 22 | 38 | 44 | 130 | 1/4 | 76.5 | 50 | 30 | 22 | 54 | 27 | 32 |

Torques(Nm)

Double Acting Actuator Torque Curve



Spring Return Actuator Torque Curve



| Actuator Speeds (sec.) | | | | | | | | |
|------------------------------|-----|------|------|-----|-----|-----|-----|-----|
| Size | 052 | 065 | 075 | 085 | 100 | 115 | 125 | 160 |
| Open Stroke/ Close Stroke | 0.3 | 0.35 | 0.45 | 0.6 | 0.8 | 1.0 | 1.3 | 2.0 |

| Actuator Weights (Kgs) | | | | | | | | |
|------------------------|------|-----|-----|-----|-----|-----|------|------|
| Size | 052 | 065 | 075 | 085 | 100 | 115 | 125 | 160 |
| Double Acting | 1.2 | 2.1 | 2.7 | 3.5 | 5.3 | 8.2 | 11.8 | 25.0 |
| Spring Return | 1.32 | 2.4 | 3.2 | 4.3 | 6.3 | 9.6 | 13.8 | 30.0 |

| Actuator Volumes (cm ³) | | | | | | | | |
|-------------------------------------|-----|-----|-----|-----|------|------|------|------|
| Size | 052 | 065 | 075 | 085 | 100 | 115 | 125 | 160 |
| Counter Clockwise | 104 | 190 | 320 | 480 | 750 | 1210 | 1560 | 2850 |
| Clockwise | 173 | 300 | 490 | 770 | 1110 | 1680 | 2300 | 5050 |

Actuator speeds are at 5.5 bar & orifice size of approx 4mm

| Double Acting Actuator Torque Data (Nm) | | | | | | |
|---|---------------------------|-----|-----|-----|-----|-----|
| Size | Air Supply Pressure (bar) | | | | | |
| | 3 | 4 | 5.5 | 6 | 7 | 8 |
| 052 | 11 | 15 | 21 | 23 | 27 | 31 |
| 065 | 22 | 29 | 39 | 43 | 50 | 57 |
| 075 | 33 | 45 | 61 | 67 | 78 | 89 |
| 085 | 49 | 65 | 90 | 98 | 114 | 131 |
| 100 | 76 | 102 | 140 | 153 | 178 | 204 |
| 115 | 126 | 168 | 231 | 252 | 294 | 337 |
| 125 | 166 | 221 | 304 | 331 | 387 | 442 |
| 160 | 326 | 434 | 597 | 651 | 760 | 869 |

| Spring Return Actuator Torque Data (Nm) | | | | | | | | | | | | | | | |
|---|--------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|
| Size | Springs/ Piston | Air Supply Pressure (bar) | | | | | | | | | | | | Spring Stroke | |
| | | 3 | | 4 | | 5.5 | | 6 | | 7 | | 8 | | | |
| | | PB | PE | PB | PE | PB | PE | PB | PE | PB | PE | PB | PE | SB | SE |
| 052 | 3 | 7 | 4.7 | 10.8 | 8.6 | 16.5 | 14.3 | | | | | | | 6 | 4.1 |
| | 4 | | | 9.3 | 6.3 | 15 | 12.1 | 16.9 | 14 | 20.8 | 17.8 | | | 7.3 | 5.4 |
| | 5 | | | | | 13.5 | 9.8 | 15.4 | 11.7 | 19.3 | 15.6 | 23.1 | 19.4 | 10.1 | 6.8 |
| | 6 | | | | | 12 | 7.6 | 13.9 | 9.5 | 17.8 | 13.3 | 21.6 | 17.1 | 12.1 | 8.1 |
| 065 | 3 | 14 | 8.9 | 21.1 | 16.1 | 31.9 | 26.9 | | | | | | | 11.3 | 6.8 |
| | 4 | | | 18.6 | 11.9 | 29.4 | 22.7 | 33 | 26.3 | 40.1 | 33.4 | | | 13.6 | 9 |
| | 5 | | | | | 26.9 | 18.5 | 30.4 | 22.1 | 37.6 | 29.2 | 44.8 | 36.4 | 18.8 | 11.3 |
| | 6 | | | | | 24.3 | 14.3 | 27.9 | 17.9 | 35.1 | 25 | 42.3 | 32.2 | 22.6 | 13.6 |
| 075 | 3 | 17.7 | 8.5 | 28.8 | 19.6 | 45.5 | 36.3 | | | | | | | 22.5 | 14.1 |
| | 4 | | | 23.6 | 11.3 | 40.3 | 28 | 45.9 | 33.5 | 57 | 44.7 | | | 26.9 | 18.8 |
| | 5 | | | | | 35.1 | 19.7 | 40.6 | 25.2 | 51.8 | 36.4 | 62.9 | 47.5 | 37.4 | 23.6 |
| | 6 | | | | | 29.8 | 11.3 | 35.4 | 16.9 | 46.5 | 28 | 57.6 | 39.2 | 44.9 | 28.3 |
| 085 | 3 | 31 | 17.5 | 47.4 | 33.9 | 71.9 | 58.4 | | | | | | | 28.3 | 16.2 |
| | 4 | | | 41.4 | 23.4 | 65.9 | 47.9 | 74.1 | 56.1 | 90.4 | 72.4 | | | 34 | 21.6 |
| | 5 | | | | | 59.9 | 37.4 | 68.1 | 45.6 | 84.4 | 61.9 | 100.7 | 78.3 | 47.2 | 27 |
| | 6 | | | | | 53.9 | 26.9 | 62.1 | 35.1 | 78.4 | 51.4 | 94.7 | 67.8 | 56.7 | 32.4 |
| 100 | 3 | 44 | 25.5 | 69.5 | 50.9 | 107.7 | 89.1 | | | | | | | 45.8 | 29.1 |
| | 4 | | | 58.7 | 34 | 96.9 | 72.1 | 109.6 | 84.9 | 135.1 | 110.3 | | | 54.9 | 38.8 |
| | 5 | | | | | 86.1 | 55.2 | 98.9 | 67.9 | 124.3 | 93.3 | 149.8 | 118.8 | 76.3 | 48.4 |
| | 6 | | | | | 75.4 | 38.2 | 88.1 | 50.9 | 113.5 | 76.4 | 139 | 101.8 | 91.6 | 58.1 |
| 115 | 3 | 77.4 | 49 | 119.5 | 91.1 | 182.6 | 154.2 | | | | | | | 69.4 | 43.9 |
| | 4 | | | 103.2 | 65.4 | 166.3 | 128.5 | 187.3 | 149.5 | 229.4 | 191.6 | | | 83.3 | 58.6 |
| | 5 | | | | | 150 | 102.8 | 171.1 | 123.8 | 213.1 | 165.9 | 255.2 | 207.9 | 115.7 | 73.2 |
| | 6 | | | | | 133.8 | 77.1 | 154.8 | 98.1 | 196.9 | 140.2 | 238.9 | 182.2 | 138.9 | 87.8 |
| 125 | 3 | 100.6 | 64.6 | 155.8 | 119.8 | 238.6 | 202.6 | | | | | | | 91 | 58.6 |
| | 4 | | | 134.1 | 86.1 | 216.9 | 168.9 | 244.5 | 196.5 | 299.8 | 251.8 | | | 109.2 | 78.1 |
| | 5 | | | | | 195.2 | 135.2 | 222.8 | 162.8 | 278.1 | 218.1 | 333.3 | 273.3 | 151.7 | 97.7 |
| | 6 | | | | | 173.5 | 101.5 | 201.1 | 129.1 | 256.4 | 184.4 | 311.6 | 239.6 | 182 | 117.2 |
| 160 | 3 | 201 | 125.4 | 309.6 | 234 | 472.4 | 396.8 | | | | | | | 180.3 | 112.3 |
| | 4 | | | 268 | 167.2 | 430.8 | 330 | 485.1 | 384.3 | 593.7 | 492.9 | | | 216.4 | 149.7 |
| | 5 | | | | | 389.3 | 263.3 | 443.5 | 317.5 | 552.1 | 426.1 | 660.7 | 534.7 | 300.5 | 187.1 |
| | 6 | | | | | 347.7 | 196.5 | 402 | 250.8 | 510.5 | 359.3 | 619.1 | 467.9 | 360.6 | 224.5 |

Actual torques are in the range of $\pm 5\%$ of the above values.

In between torque values to be interpolated.

SE= Spring End Torque, SB= Spring Break Torque, PE= Pneumatic End Torque, PB=Pneumatic Break Torque

Specifications

DelTorq Series 20, Quarter Turn Rotary, Dual Rack and Pinion design, symmetrical mounting valve actuators for Quarter Turn Valve automation.

The actuator shall be pneumatically operated and must be capable of traveling 95 degrees in forward and back directions, and deliver linear torque throughout the travel.

The travel must have an external arrangement to adjust the stroke a minimum of $\pm 5^\circ$ in both open and close positions.

Travel stop arrangement must be located outside the pressure chamber of the actuator body to prevent accidental blowouts of the travel stop screws and to avoid leak paths.

The travel stop arrangement must also be capable of locking out the actuator in both the fully open and fully closed positions for performing field maintenance safely.

The actuator must be totally enclosed in a single enclosure with no moving parts exposed. All pneumatic passageways must be integral in the housing so as to eliminate the need for external tubing. The single enclosure shall be extruded and hard-anodized aluminum with super-finished cylinder bore walls covered with end caps. The end caps must be assembled with high strength stainless steel fasteners.

The end caps must have well-rounded external contours to prevent trapping of foreign material. The end caps shall be epoxy powder coated for corrosion protection.

All interfacing air connections will be according to NAMUR to facilitate direct mounting of a variety of solenoid valves.

All metallic sliding and rotating parts must be mounted with bearings and guides designed for high cycle life and permanently factory lubricated for trouble free, long service life.

The actuator shall be provided with a mechanical visual position indicator and the shaft must be designed to allow manual override by simply removing the position indicator.

The standard output pinion shaft shall be designed and manufactured from high strength alloy steel and electroless nickel plated for corrosion protection.

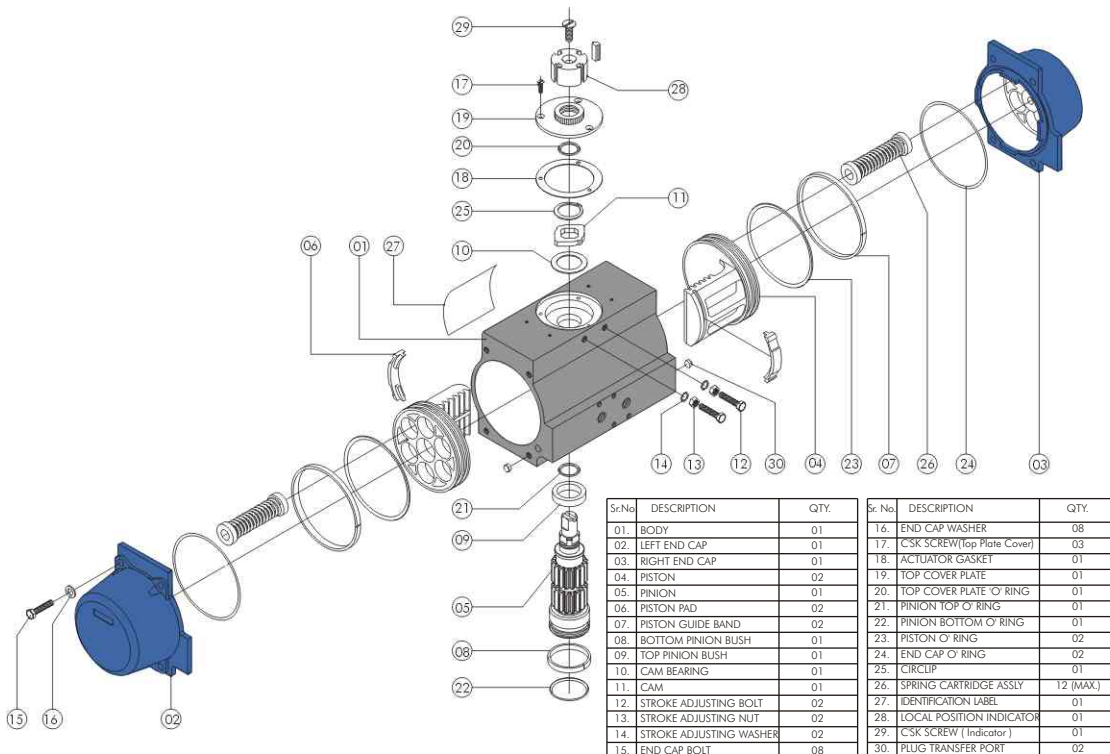
The pinion output shaft will have a slotted connection at the top to engage various drive connections of valve position and control accessories. The bottom of the pinion shaft shall be available in a variety of shapes to accommodate several valve-mounting options without brackets and couplings.

All interfacing for external accessories shall comply with international standards such as ISO 5211/ EN 12116/ VDI/VDE 3845.

The springs shall be of high quality spring steel and epoxy coated for corrosion protection.

All seals shall be in permanently lubricated nitrile rubber and the bearings shall be high-grade acetal for long life.

The actuator shall be of a modular design with the same body and end caps used for double acting and spring return design. The spring system must be designed in a safely contained, pre-compressed, cartridge construction to facilitate safe and easy field conversion from double acting to spring return and vice versa.



| Sr.No | DESCRIPTION | QTY. | Sr. No. | DESCRIPTION | QTY. |
|-------|-------------------------|------|---------|-----------------------------|-----------|
| 01. | BODY | 01 | 16. | END CAP WASHER | 08 |
| 02. | LEFT END CAP | 01 | 17. | CSK SCREW (top Plate Cover) | 03 |
| 03. | RIGHT END CAP | 01 | 18. | ACTUATOR GASKET | 01 |
| 04. | PISTON | 02 | 19. | TOP COVER PLATE | 01 |
| 05. | PINION | 01 | 20. | TOP COVER PLATE O' RING | 01 |
| 06. | PISTON PAD | 02 | 21. | PINION TOP O' RING | 01 |
| 07. | PISTON GUIDE BAND | 02 | 22. | PINION BOTTOM O' RING | 01 |
| 08. | BOTTOM PINION BUSH | 01 | 23. | PISTON O' RING | 02 |
| 09. | TOP PINION BUSH | 01 | 24. | END CAP O' RING | 02 |
| 10. | CAM BEARING | 01 | 25. | CIRCLIP | 01 |
| 11. | CAM | 01 | 26. | SPRING CARTRIDGE ASSLY | 12 (MAX.) |
| 12. | STROKE ADJUSTING BOLT | 02 | 27. | IDENTIFICATION LABEL | 01 |
| 13. | STROKE ADJUSTING NUT | 02 | 28. | LOCAL POSITION INDICATOR | 01 |
| 14. | STROKE ADJUSTING WASHER | 02 | 29. | CSK SCREW (Indicator) | 01 |
| 15. | END CAP BOLT | 08 | 30. | PLUG TRANSFER PORT | 02 |

Options & Accessories

Solenoid Valve



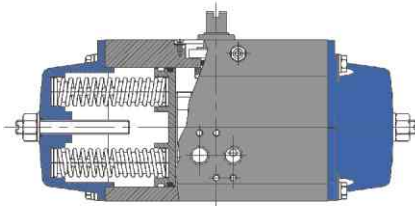
The **DelTorq** Series 82 solenoid valve is pilot operated with a direct NAMUR mount. Unique sealing plates allow for field conversion for both 3/2 way and 5/2 way designs. These valves can be used with either **DelTorq** Series 20 (double acting) or spring return actuators.

Valve Position Monitor



The **DelTorq** Series 83 valve position monitor enclosure is in molded nylon. The top cover is in impact resistant poly-carbonate and the colored indicator dome is in high-grade poly-propylene. The enclosure is waterproof to IP 65 (NEMA 4, 4x).

100% Travel Stops



The stops are located in the end caps and allow the valve position on the counter clockwise (CCW) to be set anywhere between full closed and the full open position.

Safety Lock-out



The unique travel stop cam has a built in safety lock out feature and allows for locking the actuator in either the full-open or full-closed position prior to performing maintenance work.

Dec clutchable Manual Override



The dec clutchable manual override Series 14 provides the option of manually operating the actuator and valve assembly in the event of loss of air to the actuator.

Positioners



The **DelTorq** Series 80/81 valve positioner controls the position of the spring return or the double acting rotary actuators and the valve. Pneumatic and Electro pneumatic positioners are available.

How to order DelTorq actuators

| Series | Size | Type | Trim / Other Variables/specials | | | |
|---|--|---|--|--|---|--|
| <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |
| | 052 to 200 | No. of springs | Shaft Rotation | Bolt Circle & Tapping | Shaft Connection | Sp.Options |
| 20:Hard Anodised Aluminum Body | 052 065 075 085 100 115 125 160 200 | 00 = Dble Acting 12* = 6 & 6 | C: Fail Clockwise Direction (Standard) F: Fail Counter Clockwise Direction S: Stayput (for double acting models) | J: 42mm/70mm M5 / M8 K: 50mm/70mm M6/M8 L: 70mm/102mm M8/M10 M: 70mm/125mm M8/M12 N: 125mm/165mm M12/M20 X: Other | 01: 14x10 DD 02: 16x11 DD 03: 19x13 DD 04: 22x16 DD 05: 30x22 DD 06: 11mm SQ 07: 14mm SQ 08: 17mm SQ 09: 19mm SQ 10: 22mm SQ 11: 27mm SQ XX: Other | 0: No Special requirements. S: Special requirements as specified by customer. |

* Standard

Note: For ordering actuators with standard bolt circles and shaft connection, please refer to the dimensions table in this bulletin. For other consult Virgo Engineers Limited

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