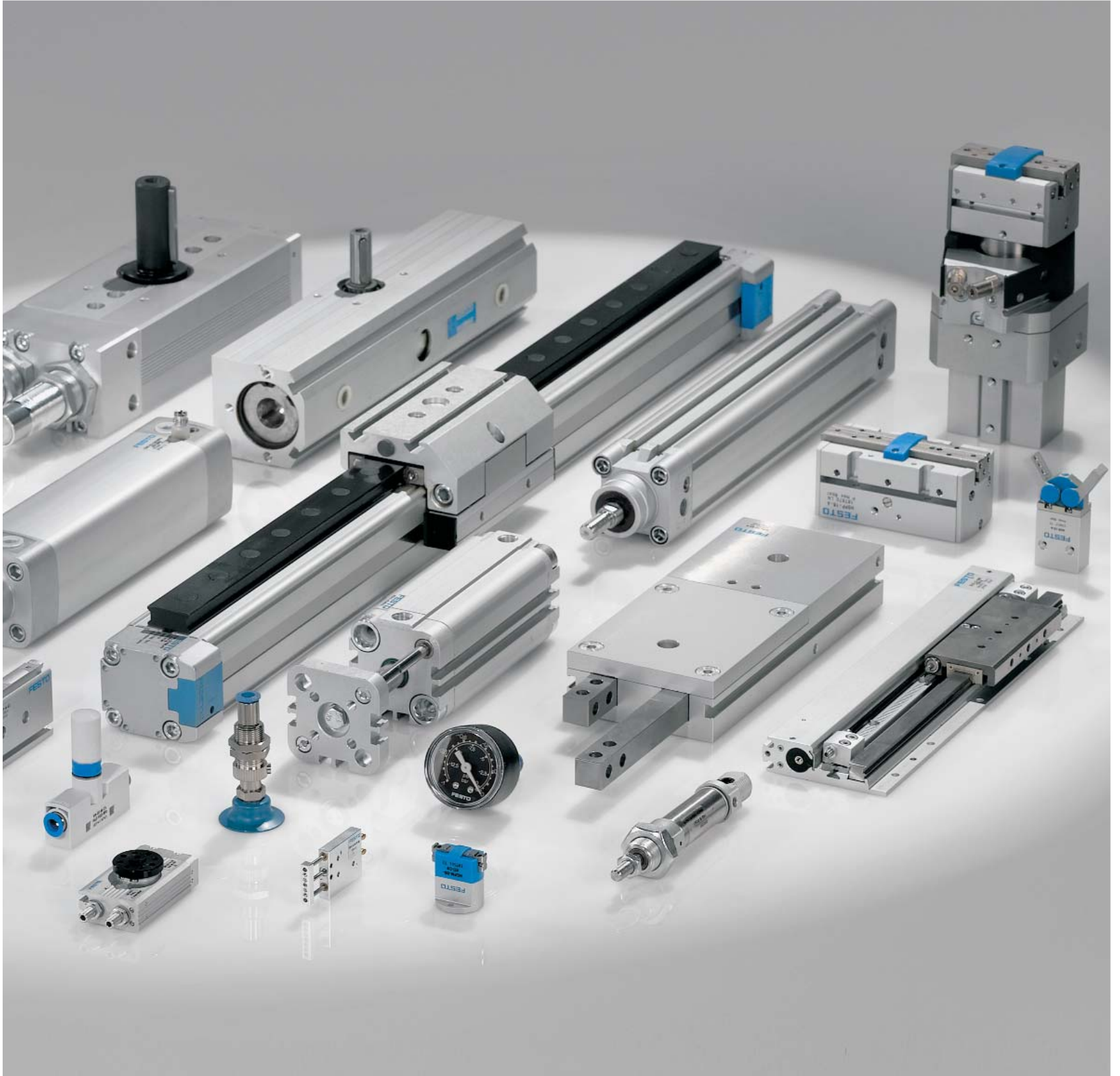


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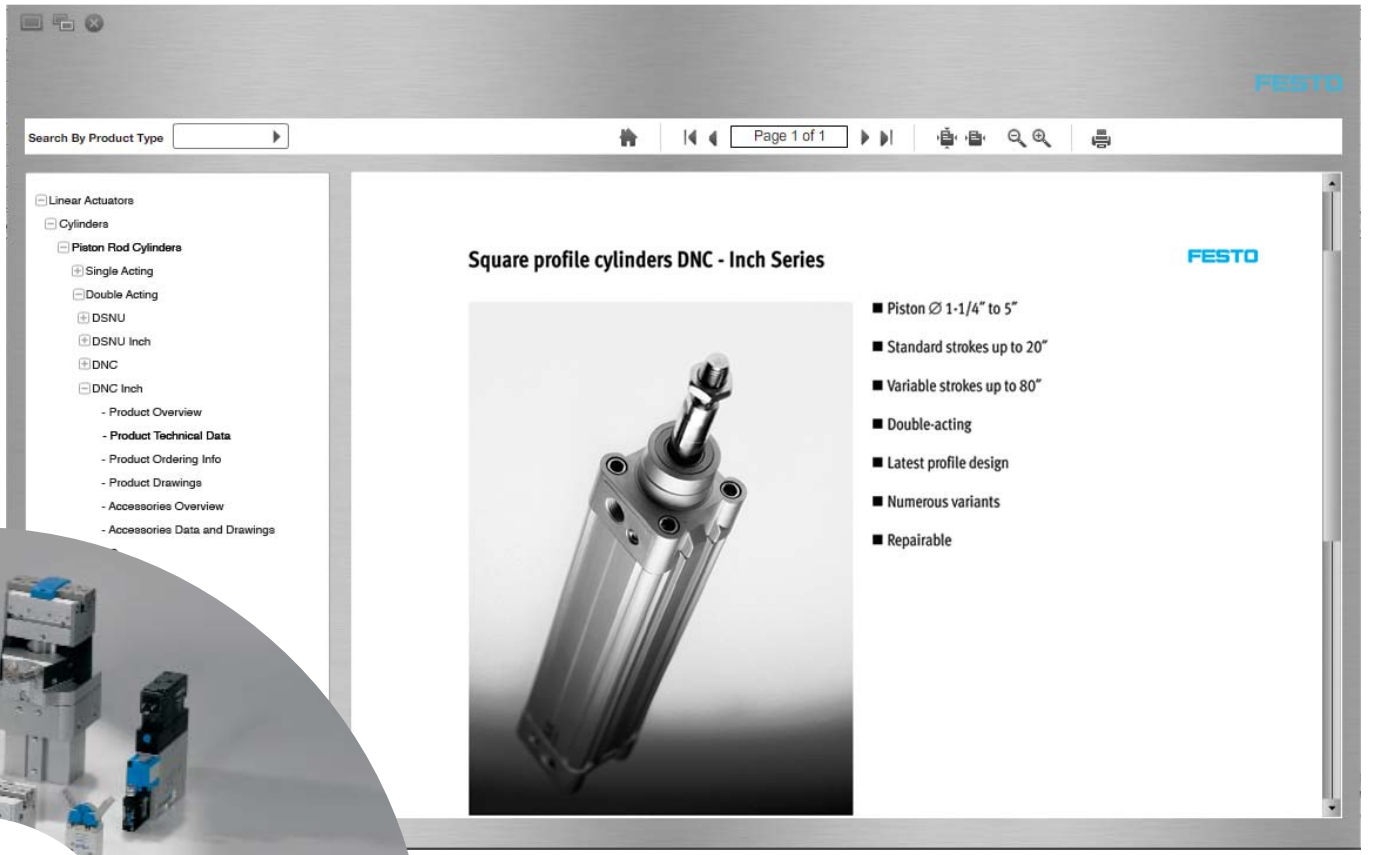
Pneumatic Actuators, Grippers and Vacuum Components

Two Easy Ways to Get Product Information

1. If you know the Festo product type you require
If you know the product type (i.e. DNC) you require information about, using the CD, simply enter the product type in the “Search by Product Type” field and click ▶

2. Search by product feature
Use the logic tree on the left menu of the CD to narrow your search (i.e. Cylinder, Piston Rod, and Double Acting) then use the attributes identified on the Product Specification table (i.e. Piston ø 8mm and heat resistant up to 150°C) to assist you in selecting products that meet your requirements.

In addition to being located on the CD, all pneumatic linear actuators, rotary actuators and end effectors Product Specification table are also printed in the brochure.





Pneumatic Linear Actuators, Rotary Actuators, Grippers and Vacuum Components

Contents

Linear Actuators ▸ Cylinders



▼ Cylinders 4
  ▼ Piston Rod Cylinders
    ▷ Single Acting 5
    ▷ Double Acting 6
  ▼ Rodless Cylinders
    ▷ Double Acting 8
    ▷ Bellows and Bladder 8
  ▶ Environmental and Specialty Cylinders 9

Rotary Actuators



▶ Rotary and Rotary/Linear Actuators 17

Linear Actuators ▸ Guided Cylinders



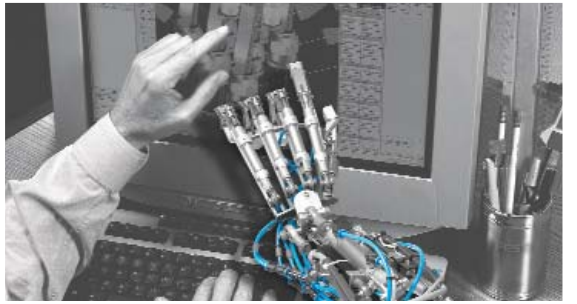
▼ Guided Cylinders 10
  ▼ Piston Rod Cylinders
    ▷ Single Acting 11
    ▷ Double Acting 12
  ▼ Rodless Cylinders
    ▷ Double Acting 14
  ▶ Specialty Cylinders 15

Grippers and Vacuum Components



▶ Grippers 19
▼ Vacuum Components
  ▷ Vacuum Generators 20
  ▷ Suction Cups 20
  ▷ Gauges & Accessories 21

Engineering Support



▶ Cylinder Sizing by Piston Force 23
▶ Buckling Load 24
▶ Air Consumption and Quality 25

References

▶ CD Search Functions 2
▶ Table of Contents 3
▶ Product Type Index 26
▶ Product Range Overview 27



Cylinders

▼ Piston Rod Cylinders

▷ Single Acting 5

▷ Double Acting 6

▼ Rodless Cylinders

▷ Double Acting 8

▷ Bellows and Bladder 8

▶ Environmental and Specialty Cylinders 9

▶ Piston Rod Cylinders ▷ Single Acting

Product Specifications							Rod Thread/Connection								Function/Performance			Special Environment					Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Magnet for Positioning Sensing	Male Rod Thread	Without Thread	Female Rod Thread	Extended Male Thread	Special Thread	Shortened Male Thread	Extended Piston Rod	Axial Air Connection	Function/Performace	Through, Hollow Piston Rod, Heat Resistant up to 150°C/302°F	Pulling Version	Heat Resistant up to 150°C	Through, Hollow Piston Rod	Through, Hollow Piston Rod, Heat Resistant up to 150°C/302°F	Free of Copper, PTFE and Silicone	Smooth Anodised Piston Rod	Same/Next Day	≤ One Week	> One Week
					P	A			K3	K2	K5	K6	K8	MA	S2	S206	Z	S6	S20	S26	CT	K10			
General																									
EG		Metric [mm]	2.5 to 6	5 to 25	■		■	■															□		□
EGZ		Metric [mm]	6 to 16	5 to 15			■																■		
ESNU		Metric [mm]	8 to 63	1 to 50	■	□	□		□	□	□	□	□	□							□			□	□
ESNU Inch		Inch [in]	5/16 to 2 1/2	0.04 to 2	■	□	■																	■	
Compact																									
EMM		Metric [mm]	10 to 32	5 to 15		■	■										□	□					□		□
AEVC		Metric [mm]	4 to 100	2.5 to 25	■	□	□	□	□														□		□
AEVU		Metric [mm]	12 to 100	1 to 25		■	□		□						□	□	□	□	□	□				■	
AEVU Inch		Inch [in]	1/2 to 4	0.05 to 1		■	□		□						□		□	□	□					■	
AEN		Metric [mm]	12 to 125	1 to 500	■	■	□		□	□	□		□				□	□				□			■

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Cylinders

▶ Piston Rod Cylinders ▷ Double Acting

Product Specifications								Rod Thread/Air Connection								Function/Performance									Special Environment										Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Magnet for Positioning Sensing	Male Rod Thread	Extended Male Thread	Shortened Male Thread Piston Rod	Female Rod Thread	Special Thread	Without Thread	Extended Piston Rod	Special Spanner Flats	Axial Air Connection	Reinforcemed Piston Rod	Through Piston Rod	Through, Hollow Piston Rod	Slow Speed (Constant Motion)	Low Friction	Clamping Unit	End-position Lock	Tandem/high-force Cylinder	Multi-position Cylinder	Stainless Steel, Corrosion and Acid Resistant	Stainless Steel, USDA H1 Approved	Stainless Steel Piston Rod	Increased Corrosion Protection	Heat Resistant up to 150°C/302°F	Through Piston Rod, Heat Resistant up to 150°C	Through, Hollow Piston Rod, Heat Resistant up to 150°C	Wiper Seal	Smooth Anodized Piston Rod	Free of Copper, PTFE and Silicone	Same/Next Day	≤ One Week	> One Week
					P	PPV	A		K2	K6	K3	K5		K8	K7	MA	S1	S2	S20	S10	S11	KP	EL	H,T	M,P			S3	R3,S8	S6	S26	S206	R8	K10	CT			
General																																						
DSNU		Metric [mm]	8 to 63	1 to 500	□	□	□	□	□	□	□	□		□		□		□		□	□	□						□	□					□	□	□
DSNU Inch		Inch [in]	5/16 to 2 1/2	0.04 to 19.6	□	□	□	■										□																□	□	
DNC		Metric [mm]	32 to 125	10 to 2,000	□	□	□	□	□		□	□		□	□			□	□	□	□	□	□	T					□	□			□	□	□	□	
DNC Inch		Inch [in]	1 1/4 to 5	0.4 to 80	□	□	□	□	□		□	□		□				□											□	□						■	
DNG		Metric [mm]	32 to 320	10 to 2,000		■	■	■										□										□	□	□					□	□	□
DNG Inch		Inch [in]	1 1/4 to 6	0.4 to 78.7		■	■	■										□												□						■	
DNA Inch		Inch [in]	1 1/2 to 5	1/2 to 80	□	□	■	□	□		□	□	□	□				□												□						■	
Compact																																						
ADVC		Metric [mm]	4 to 100	2.5 to 25	■		□	□			□		□																								■
DMM		Metric [mm]	10 to 32	5 to 50	■		■	■										□	□										□								■
ADN		Metric [mm]	12 to 125	1 to 500	■		■	□	□		□	□		□			□		□	□	□			H	M				□	□				□			■
ADVU		Metric [mm]	12 to 125	1 to 400	■		■	□			□							□	□					T	P				□	□	□	□			□	□	□	□
ADVU Inch		Inch [in]	1/2 to 5	0.04 to 16	■		■	□			□							□	□											□					□	□	
Stainless Steel																																						
CRDSNU		Metric [mm]	12 to 25	10 to 500	■		■	■										□								■		■	■							■	
CRDSNU Inch		Inch [in]	1/2 to 1	0.4 to 19.7	■		■	■										□								■		■	■							■	
CRDG		Metric [mm]	12 to 63	1 to 500	■		■	■																		■		■	■								■
CRDSW		Metric [mm]	32 to 63	1 to 500	■		■	■																		■		■	■							■	
CRDSW Inch		Inch [in]	1 1/4 to 2 1/2	0.04 to 20	■		■	■																		■		■	■							■	
CRHD		Metric [mm]	32 to 100	10 to 500		■	■	■																		■	■	■	■	□							■
CRDNG		Metric [mm]	32 to 125	10 to 2,000		■	■	■										□								■		■	■	□						■	
CRDNG Inch		Inch [in]	1 1/4 to 5	0.4 to 78		■	■	■										□								■		■	■							■	

Product Specifications								Rod Thread/Air Connection								Function/Performance									Special Environment											Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Magnet for Positioning Sensing	Male Rod Thread	Extended Male Thread	Shortened Male Thread Piston Rod	Female Rod Thread	Special Thread	Without Thread	Extended Piston Rod	Special Spanner Flats	Axial Air Connection	Reinforcemed Piston Rod	Through Piston Rod	Through, Hollow Piston Rod	Slow Speed (Constant Motion)	Low Friction	Clamping Unit	End-position Lock	Tandem/high-force Cylinder	Multi-position Cylinder	Stainless Steel, Corrosion and Acid Resistant	Stainless Steel, USDA H1 Approved	Stainless Steel Piston Rod	Increased Corrosion Protection	Heat Resistant up to 150°C/302°F	Through Piston Rod, Heat Resistant up to 150°C	Through, Hollow Piston Rod, Heat Resistant up to 150°C	Wiper Seal	Smooth Anodized Piston Rod	Free of Copper, PTFE and Silicone	Same/Next Day	≤ One Week	> One Week
					P	PPV	A		K2	K6	K3	K5		K8	K7	MA	S1	S2	S20	S10	S11	KP	EL	H,T	M,P			S3	R3,S8	S6	S26	S206	R8	K10	CT			
Clean Design																																					
CDN		Metric [mm]	32 to 100	10 to 2,000		■	□	□	□		□			□				□											□								■
Process Valve Actuator																																					
DLP		Metric [mm]	80 to 320	40 to 2,000			□	■																													■
Stopper Cylinder																																					
STA		Metric [mm]	20 to 80	15 to 40	■		■						■																							□		□

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Cylinders

▶ Rodless Cylinders ▷ Double Acting

Product Specifications								Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Magnet for Positioning	Same/Next Day	≤ One Week	> One Week
					P	PPV	A			
DGO		Metric [mm]	12 to 40	10 to 4,000	■ 1/2	■	■		■	
DGO Inch		Inch [in]	1/2 to 1 5/8	0.5 to 157	■ 1/2	■	■		■	

▶ Rodless Cylinders ▷ Bellows and Bladders

Product Specifications					Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Same/Next Day	≤ One Week	> One Week
EB		Metric [mm]	145 to 385	60 to 230	□		□
EBS		Metric [mm]	80 to 100	105 to 110			■
EV		Metric [mm]	12 to 63	3 to 5	□		□
MAS		Metric [mm]	10 to 40	Length 40 to 9,000		□	□

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Cylinders

▶ Environmental and Specialty Cylinders

Product Specifications								Rod Thread/Connection					Function	Special Environment					Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Magnet for Positioning Sensing	Male Rod Thread	Extended Male Thread	Female Rod Thread	Without Thread	Extended Piston Rod	Through Piston Rod	Stainless Steel Corrosion and Acid Resistant	Stainless Steel, USDA H1 Approved	Stainless Steel Piston Rod	Increased Corrosion Protection	Heat Resistant up to 150°C/302°F	Same/Next Day	≤ One Week	> One Week
					P	PPV	A		K2	K3		K8	S2			S3	R3, S8	S6			
Stainless Steel																					
CRDSNU		Metric [mm]	12 to 25	1 to 500	■		■	■					□	■						■	
CRDSNU Inch		Inch [in]	1/2 to 1	0.4 to 19.7	■		■	■					□	■						■	
CRDG		Metric [mm]	12 to 63	1 to 500	■		■	■						■							■
CRDSW		Metric [mm]	32 to 63	1 to 500	■		■	■						■						■	
CRDSW Inch		Inch [in]	1 1/4 to 2 1/2	0.04 to 20	■		■	■						■						■	
CRHD		Metric [mm]	32 to 100	10 to 500		■	■	■						■	■	■	■	□			■
CRDNG		Metric [mm]	32 to 125	10 to 2,000		■	■	■					□	■		■	■	□		■	
CRDNG Inch		Inch [in]	1 1/4 to 5	0.4 to 78		■	■	■					□	■		■	■			■	
Clean Design																					
CDN		Metric [mm]	32 to 100	10 to 2,000		■	□	□	□	□		□	□					□			■
Process Valve Actuator																					
DLP		Metric [mm]	80 to 320	10 to 2,000			□	■													■
Stopper Cylinder																					
STA		Metric [mm]	20 to 80	15 to 40		■	■				■								□		□

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □



Guided Cylinders

▼ Piston Rod Cylinders

▷ Single Acting 11

▷ Double Acting 12

▶ Rodless Cylinders 14

▶ Specialty Cylinders 15

▶ Guided Piston Rod Cylinders ▷ Single Acting

Product Specifications							Rod Thread/Connection						Function/ Performance			Special Environment				Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Magnet for Positioning Sensing	Male Rod Thread	Without Thread	Female Rod Thread	Extended Male Thread	Special Thread	Extended Piston Rod	Through Piston Rod	Through, Hollow Piston Rod	Pulling Version	Heat Resistant up to 150°C	Through Piston Rod, Heat Resistant up to 150°C	Through Hollow Piston Rod Heat Resistant up to 150°C	Smooth Anodized Piston Rod	Same/Next Day	≤ One Week	> One Week
					P	A			K3	K2	K5	K8	S2	S20	Z	S6	S26	S206	K10			
Square Rod																						
AEVULQ		Metric [mm]	12 to 100	1 to 25	■	■	□		□				□	□	□	□	□	□			■	
AEVULQ Inch		Inch [in]	5/8 to 4	0.04 to 1	■	■	□		□				□		□	□					■	
AEN-Q		Metric [mm]	12 to 125	1 to 500	■	■	□		□	□	□	□			□	□			□			■
Oval Piston																						
EZH		Metric [mm]	3.6 to 22	10 to 50		■		■												■		
Bearing Guided Piston																						
EMML		Metric [mm]	10 to 32	5 to 15	■	■										□						■

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Guided Cylinders

▶ Guided Piston Rod Cylinders ▷ Double Acting

Product Specifications									Rod Thread/Connection							Function/Performance						Special Environment						Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Shock Absorber, Internal Mounting	Magnet for Positioning Sensing	Male Rod Thread	Female Rod Thread	Without Thread	Extended Male Thread	Special Thread	Extended Piston Rod	With Adjustable Trunnion Mounting	Clamping Unit	Through Piston Rod	Through, Hollow Piston Rod	Plain Bearing Guide	Recirculating Ball Bearing Guide	End-position Lock	Heat resistant up to 150°C	Free of Copper, PTFE, and Silicone	Increased Corrosion Protection	Wiper Seal	Through Piston Rod, Heat Resistant up to 150°C	Through Hollow Piston Rod, Heat Resistant up to 150°C	Same/Next Day	≤ One Week	> One Week
					P	PPV		A		K3		K2	K5	K8		KP	S2	S20	GF	KF	EL	S6	CT	R3	R8	S26	S206			
Square Rod																													
ADN-Q		Metric [mm]	12 to 125	1 to 500	■			■	□	□		□	□	□			□	□				□								■
ADVULQ		Metric [mm]	12 to 125	1 to 400	■			■	□	□							□	□				□				□	□		■	
ADVULQ Inch		Inch [in]	1/2 to 5	0.05 to 16	■			■	□	□							□	□				□				□			■	
DNC-Q		Metric [mm]	32 to 125	10 to 2,000	□	□		□	□	□		□	□	□			□					□		□	□				■	
DSNU-Q		Metric [mm]	8 to 63	1 to 500	□	□		□	□	□		□	□	□			□							□					■	
DNGL		Metric [mm]	32 to 320	10 to 2,000		■		■							□		□					□							■	
DNGL Inch		Inch [in]	1 1/4 to 4	0.04 to 24		■		■																					■	
Oval Piston																													
DZF		Metric [mm]	12 to 63	1 to 1,000	■			■	□	□							□	□				□							■	
DZF Inch		Inch [in]	1/2 to 2 1/2	3/8 to 12	■			■	□	□							□	□				□							■	
DZH		Metric [mm]	16 to 63	1 to 1,000		■		■	■								□	□				□						□	□	
DZH Inch		Inch [in]	5/8 to 2 1/2	0.04 to 40		■		■	■								□					□							■	
Bearing Guided Piston																													
DFP		Metric [mm]	10 to 80	25 to 500	□	□		■		■							□													■
DPZ		Metric [mm]	10 to 32	10 to 100	■			■									□	□	□	□		□								■
DPZC		Metric [mm]	6 to 16	10 to 100	■			■									□		□	□										■
HMP		Metric [mm]	16 to 32	50 to 400			■	■								□														■

Product Specifications					Rod Thread/Connection							Function/Performance						Special Environment						Lead Time [1]		
Type	Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Shock Absorber, Internal Mounting	Magnet for Positioning Sensing	Male Rod Thread	Female Rod Thread	Without Thread	Extended Male Thread	Special Thread	Extended Piston Rod	With Adjustable Trunnion Mounting	Clamping Unit	Through Piston Rod	Through, Hollow Piston Rod	Plain Bearing Guide	Recirculating Ball Bearing Guide	End-position Lock	Heat resistant up to 150°C	Free of Copper, PTFE, and Silicone	Increased Corrosion Protection	Wiper Seal	Through Piston Rod, Heat Resistant up to 150°C	Through Hollow Piston Rod, Heat Resistant up to 150°C	Same/Next Day	≤ One Week	> One Week
				P	PPV		A		K3		K2	K5	K8		KP	S2	S20	GF	KF	EL	S6	CT	R3	R8	S26	S206			
Integrated Linear Guide																													
DFC		Metric [mm]	4 to 10	5 to 30	■			□										□	□										■
DFM		Metric [mm]	12 to 100	10 to 200	■			■										□	□								□		□
DFM-B		Metric [mm]	12 to 100	10 to 400	□	□	□	■										□	□		□								■
ADVUL		Metric [mm]	12 to 100	1 to 400	■			■								□					□	□					□	□	
DMML		Metric [mm]	10 to 32	5 to 50	■			■	■							□	□				□								■
HMPL		Metric [mm]	12 to 20	30 to 200			■	■							□				■										■
SLE		Metric [mm]	10 to 50	10 to 500			□	■											■										■
SLF		Metric [mm]	6 to 16	10 to 80	■			■											■										■
SLS		Metric [mm]	6 to 16	5 to 30	■			■											■										■
SLT		Metric [mm]	6 to 25	10 to 200	■		□	■											■								■		

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Guided Cylinders

▶ Guided Rodless Cylinders ▷ Double Acting

Product Specifications									Function/Performance				Special Environment		Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Shock Absorber, Internal Mounting	Magnet for Positioning Sensing	Clamping Unit	Plan Bearing Guide	Recirculating Ball Bearing Guide	Passive Guide Axis	Heat Resistant up to 150°C	Free of Copper, PTFE, and Silicone	Same/Next Day	≤ One Week	> One Week
					P	PPV		A	KP	GF	KF	FA	S6	CT			
SLG		Metric [mm]	8 to 18	100 to 900	□		□	■			■						■
DGC		Metric [mm]	8 to 40	1 to 5,000	□	□	□	■		□	□	■					■
SPZ		Metric [mm]	10 to 32	10 to 100	■			■		□	□		□				■
SLM		Metric [mm]	12 to 40	10 to 1,500			□	■			■					■	
DGP		Metric [mm]	18 to 80	10 to 3,000		■		■						□		■	
DGP Inch		Inch [in]	11/16 to 3	0.4 to 118		■		■								■	
DGPL		Metric [mm]	18 to 80	10 to 3,000		■	□	■	□	□	□			□		■	
DGPL Inch		Inch [in]	11/16 to 3	0.4 to 118		■		■		□	□					■	

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

▶ Guided Specialty Cylinders

Product Specifications									Rod Thread			Function/ Performance			Special Environment	Lead Time [1]		
Type		Dimensions	Piston ø	Stroke	Fixed Cushioning	Adjustable Cushioning	Shock Absorber, Internal Mounting	Magnet for Positioning Sensing	Male Thread	Without Thread	Female Rod Thread	Through Piston Rod	Through, Hollow Piston Rod	Recirculating Ball Bearing Guide	Heat Resistant up to 150°C	Same/Next Day	≤ One Week	> One Week
					P	PPV		A			K3	S2	S20	KF	S6			
Narrow Profile																		
EZH		Metric [mm]	3.6 to 22	10 to 50				■		■						■		
DZF		Metric [mm]	12 to 63	1 to 1,000	■			■	□		□	□	□		□		■	
DZF Inch		Inch [in]	1/2 to 2 1/2	3/8 to 12	■			■	□		□	□	□		□		■	
DZH		Metric [mm]	16 to 63	1 to 1,000		■		■	■			□	□		□	□	□	
DZH Inch		Inch [in]	5/8 to 2 1/2	0.04 to 40		■		■	■			□			□		■	
Escapements																		
HPV		Metric [mm]	14 to 22	20 to 60				■								□		□
Rotary/Linear																		
DSL		Metric [mm]	16 to 40	10 to 200 Swivel Angel: 0° to 270°	■		□	■	■			□	□	■				■
Pick and Place																		
HSP		Metric [mm]	12 to 25	Strokes: Y=52 to 170 Z= 20 to 70			■	■		■								■

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Guided Cylinders



Rotary Actuators

▶ Rotary and Rotary/Linear Actuators 17

▶ Rotary and Rotary/Linear Actuators

Product Specifications											Function/ Performance			Lead Time [1]		
Type		Dimensions	Description	Piston ø	Stroke	Torque	Fixed Cushioning	Shock Absorber, Internal Mounting	International Mounted Shock Absorber	Magnet for Positioning Sensing	Through Piston Rod	Through, Hollow Piston Rod	Recirculating Ball Bearing Guide	Same/Next Day	≤ One Week	> One Week
							P	PPV		A	S2	S20	KF			
General																
DSM		Metric [mm]	Swivel Module	6 to 40	0° to 270°	0.15 to 20 Nm	■		□	■				□		□
DRQD		Metric [mm]	Semi Rotary Drives	6 to 50	0° to 360°	0.16 to 50 Nm		□	□	■					□	□
DSR		Metric [mm]	Semi Rotary Drives	10 to 40	0° to 184°	0.37 to 14.75 Nm	■			■				■		
DSR Inch		Inch [in]	Semi Rotary Drives	3/8 to 1 5/8	0° to 184°	0.5 to 20 Nm	■			■				□		□
DRQ		Metric [mm]	Semi Rotary Drives	16 to 100	0° to 360°	0.5 to 150 Nm		■		■						■
Process Valve Actuators																
DAPS		Metric [mm]	Semi Rotary Process Drives		0° to 90°	15 to 1,920 Nm										■
DRD		Metric [mm]	Semi Rotary Process Drives		0° to 90°	2.5 to 11,750 Nm										■
DRE		Metric [mm]	Semi Rotary Process Drives		0° to 90°	2.5 to 9,305 Nm										■
Rotary/Linear																
DSL		Metric [mm]	Swivel-Linear Drive Units	16 to 40	10 to 200, Swivel Angel: 0° to 270°	1.25 to 20 Nm	■		□	■	□	□	■			■

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Rotary Actuators



Grippers and Vacuum Components

▶ Grippers 19

▼ Vacuum Components

▷ Vacuum Generators 20

▷ Suction Cups 20

▷ Gauges & Accessories 21

Grippers

▶ Grippers

Product Specifications												Lead Time [1]		
Type		**Dimensions**	**Description**	**Piston ø**	**Stroke**	Fixed Cushioning	International Mounted Shock Absorber	Magnet for Positioning Sensing	Gripper Retention Force — Open	Gripper Retention Force — Closed	Dust Cap	Same/Next Day	≤ One Week	> One Week
						P		A	G1	G2	SSK			
Parallel Grippers														
HGP		Metric [mm]	Parallel Gripper	6 to 35	4 to 25			■	□	□	□	□		□
HGPM		Metric [mm]	Micro Parallel Gripper	8 to 12	4 to 6				□	□				■
HGPP		Metric [mm]	Precision Gripper	10 to 32	4 to 25			■	□	□				■
HGPC		Metric [mm]	Parallel Gripper	12	6			■		□				■
HGPL		Metric [mm]	Long Stroke Gripper	14 to 40	80 to 160			■						■
HGPT		Metric [mm]	T-slot Gripper	16 to 63	6 to 32			■	□	□				■
Radial Grippers														
HGWM		Metric [mm]	Micro Angle Gripper	8 to 12	40°				□	□				■
HGR		Metric [mm]	Radial gripper	10 to 40	180°			■				■		
HGW		Metric [mm]	Angle Gripper	10 to 40	40°			■				■		
3 Point Grippers														
HGD		Metric [mm]	Three Point Gripper	16 to 50	5 to 12			■				■		
Rotary Parallel Grippers														
HGDS		Metric [mm]	Rotary Parallel Gripper	12 to 20	5 to 14	□	□	■						■
Suction Grippers														
ESG		Metric [mm]	Suction Gripper	Vacuum Cup	2 to 200									■

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

■ Standard □ Available

▶ Vacuum Components ▷ Vacuum Generators

Product Specifications							Lead Time [1]		
Type		Dimensions	Description	Size	Connection Vacuum	Max. Vacuum	Same/Next Day	≤ One Week	> One Week
VAD		Metric [mm]	Basic Metal Design	0.5 to 1.5	M5, G1/8, G1/4, G3/8	80%	■		
VADM		Metric [mm]	Additional Functions	0.45 to 3	M5, G1/8, G1/4, G3/8	84%	□		□
VAD-M		Metric [mm]	Additional Functions	0.7 to 2	M5, G1/8, G1/4, G3/8	85%	■		
VAK		Metric [mm]	With Blow-off Air Pulse	1.0	G1/4	80%	■		
VN		Metric [mm]	Basic Polymer Design, Additional Functions	0.45 to 3	M5, G1/8, G1/4, G3/8	93%	□		□

▶ Vacuum Components ▷ Suction Cups

Product Specifications					Lead Time [1]		
Type		Description	Dimensions[2]	Size	Same/Next Day	< One Week	> One Week
VAS/VASB		Suction Cup	Metric [mm]	1 to 125	□		□
ESS/ESV		Suction Cup	Metric [mm]	2 to 200	□		□
ESG		Suction Gripper Assembly (Combination of ESS, ESH and/or ESF, ESWA)	Metric [mm]	2 to 200			■
ESH		Suction Cup Holder	Metric [mm]	1 to 6	□		□
ESF		Vacuum Filter	Metric [mm]	3 to 4			■
ESWA		Angle Compensator	Metric [mm]	3 to 5			■

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

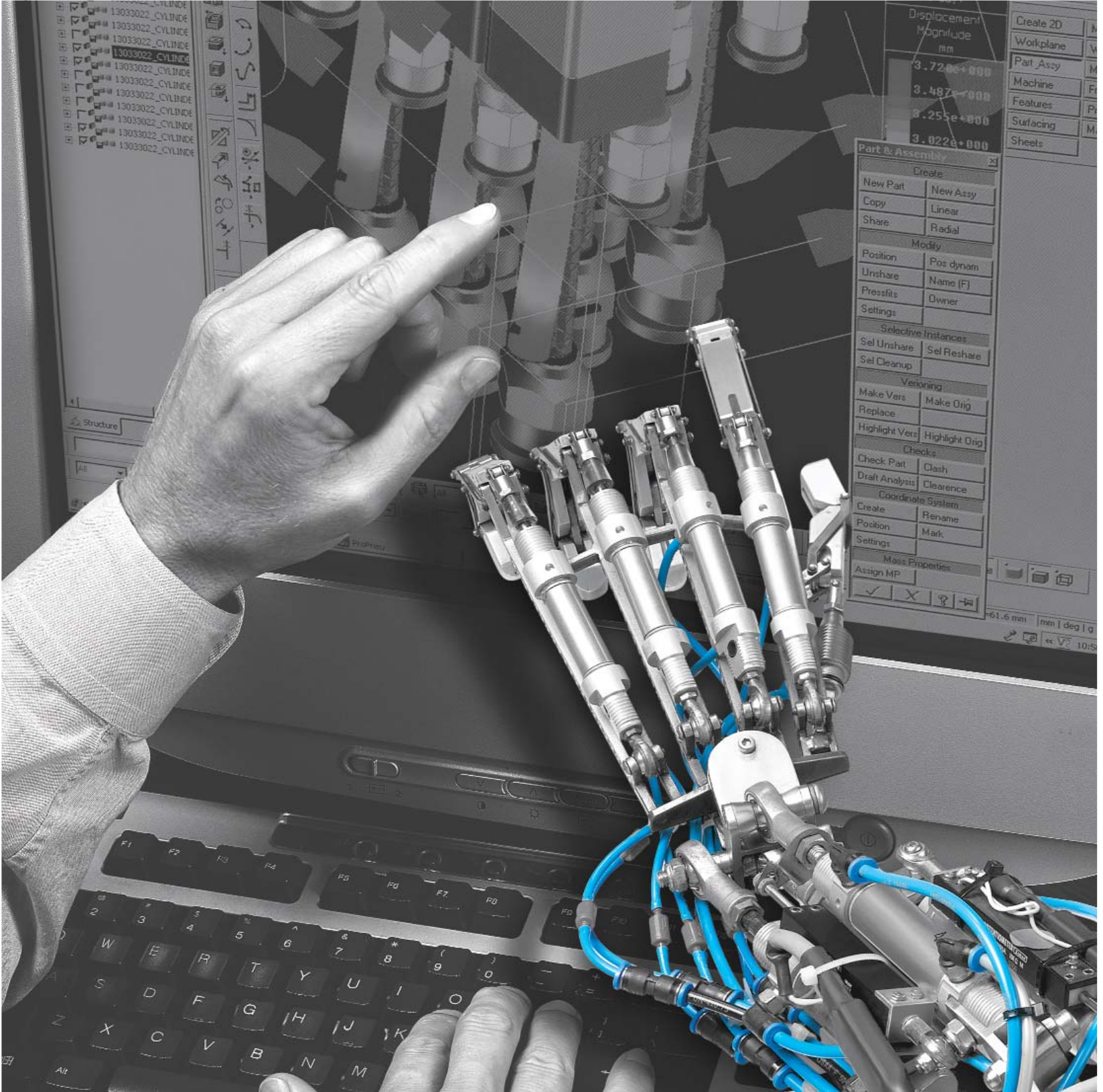
▶ Vacuum Components ▷ Gauges and Accessories

Product Specifications				Lead Time [1]		
Type		Description	Specification	Same/Next Day	≤ One Week	> One Week
VAM		Vacuum Gauge	Pressure -1 to 0 bar	□		□
FVAM		Vacuum Gauge with Flaunge Mount	Pressure -1 to 0 bar			■
ESF		Vacuum Filter	For Holder Sizes 3 or 4			■
ESWA		Angle Compensator	For Holder Sizes 3, 4 or 5			■
ISV		Vacuum Efficiency Valve	Pressure 4 to 6 bar	■		
U		Silencer	Connection NPT or ISO	■		
VAL		Height Compensator	For compensation length 5, 10 or 20mm	■		

1) The lead times shown are typical times from order placement until the item will ship, and are approximate only. The actual shipping date will be confirmed upon order placement. Products with more than one lead-time listed reflect variations for options ordered.

Standard ■ Available □

Vacuum Components



Engineering Support

- Cylinder Sizing by Piston Force 23
- Buckling Load 24
- Air Consumption and Quality 25

Cylinder Sizing by Piston Force

Actuators

Metric Series

Piston Force[1] (N)												
Piston Ø mm	Operating Pressure (bar)											
	1	2	3	4	5	6	7	8	9	10	11	12
2.5	0.4	0.9	1.3	1.8	2.2	2.7	3.1	3.5	4.0	4.4	4.9	5.3
3.5	0.9	1.7	2.6	3.5	4.3	5.2	6.1	6.9	7.8	8.7	9.5	10.4
5.35	2.0	4.0	6.1	8.1	10.1	12.1	14.2	16.2	18.2	20.2	22.3	24.3
6	2.5	5.1	7.6	10.2	12.7	15.3	17.8	20.4	22.9	25.4	28.0	30.5
8	4.5	9.0	13.6	18.1	22.6	27.1	31.7	36.2	40.7	45.2	49.8	54.3
10	7.1	14.1	21.2	28.3	35.3	42.4	49.5	56.5	63.6	70.7	77.8	84.8
12	10.2	20.4	30.5	40.7	50.9	61.1	71.3	81.4	91.6	102	112	122
16	18.1	36.2	54.3	72.4	90.5	109	127	145	163	181	199	217
20	28.3	56.5	84.8	113	141	170	198	226	254	283	311	339
25	44.2	88.4	133	177	221	265	309	353	398	442	486	530
32	72.4	145	217	290	362	434	507	579	651	724	796	869
40	113	226	339	452	565	679	792	905	1,018	1,131	1,244	1,357
50	177	353	530	707	884	1,060	1,237	1,414	1,590	1,767	1,944	2,121
63	281	561	842	1,122	1,403	1,683	1,964	2,244	2,525	2,806	3,086	3,367
80	452	905	1,357	1,810	2,262	2,714	3,167	3,619	4,072	4,524	4,976	5,429
100	707	1,414	2,121	2,827	3,534	4,241	4,948	5,655	6,362	7,069	7,775	8,482
125	1,104	2,209	3,313	4,418	5,522	6,627	7,731	8,836	9,940	11,045	12,149	13,254
160	1,810	3,619	5,429	7,238	9,048	10,857	12,667	14,476	16,286	18,096	19,905	21,715
200	2,827	5,655	8,482	11,310	14,137	16,965	19,792	22,619	25,447	28,274	31,102	33,929
250	4,418	8,836	13,254	17,671	22,089	26,507	30,925	35,343	39,761	44,179	48,597	53,014
320	7,238	14,476	21,715	28,953	36,191	43,429	50,668	57,906	65,144	72,382	79,621	86,859

Table Values Based on the Equation: Force = (Pressure x Area) - Friction fource. *Assuming 1 bar = 15 psi
Friction force assumed to be 10% of force. Table reflects 0.9 multiplier.

Note 1: Piston force values in the table above are based on the extend ("push") stroke.
Piston force values for retract ("pull") stroke are as follows:
— Single acting piston rod cylinders retract ("pull") piston force is based upon the spring force within cylinder.
— Double acting piston rod cylinders retract ("pull") piston force is based upon the ratio of the piston rod diameter to the piston diameter, resulting in piston force reductions ranging from 10%-25%.
— Rodless cylinders retract ("pull") piston force is equal to the extend ("push") force.

Inch Series

Piston Force[1] (lbf)												
Piston Ø inch	Operating Pressure (psi)											
	15	30	45	60	75	90	105	120	135	150	165	180
3/32	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2
1/8	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	1.9	2.1	2.3
7/32	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5	5.0	5.5
1/4	0.6	1.1	1.7	2.3	2.9	3.4	4.0	4.6	5.1	5.7	6.3	6.9
5/16	1.0	2.0	3.1	4.1	5.1	6.1	7.1	8.1	9.2	10	11	12
3/8	1.6	3.2	4.8	6.4	7.9	9.5	11	12	14	15	17	19
1/2	2.3	4.6	6.9	9.2	11	13	16	18	20	22.9	25	27
5/8	4.1	8.1	12	16	20	24	28	32	36	40.7	44	48
3/4	6.4	12	19	25	31	38	44	50	57	63.6	69	76
1	9.9	19	29	39	49	59	69	79	89	99	109	119
1-1/4	16	32	48	65	81	97	113	130	146	162	179	195
1-5/8	25	50	76	101	127	152	178	203	228	254	279	305
2	39	79	119	158	198	238	278	317	357	397	437	476
2-1/2	63	126	189	252	315	378	441	504	567	630	693	756
3	101	203	305	406	508	610	711	813	915	1,017	1,118	1,220
4	158	317	476	635	794	953	1,112	1,271	1,430	1,589	1,748	1,906
5	248	496	744	993	1,241	1,489	1,738	1,986	2,234	2,482	2,731	2,979
6	406	813	1,220	1,627	2,034	2,440	2,847	3,254	3,661	4,068	4,474	4,881
8	635	1,271	1,906	2,542	3,178	3,813	4,449	5,085	5,720	6,356	6,992	7,627
10	993	1,986	2,979	3,972	4,965	5,959	6,952	7,945	8,938	9,931	10,925	11,918
12-1/2	1,627	3,254	4,881	6,508	8,136	9,763	11,390	13,017	14,645	16,272	17,899	19,526

▶ Engineering Support ▷ Buckling Load

Actuators

Buckling Load Diagram

The allowable load on the piston rod for long strokes is limited by the buckling factor. The load must not exceed certain limits, depending on stroke and piston rod diameter. The diagram below is based on the following formula:

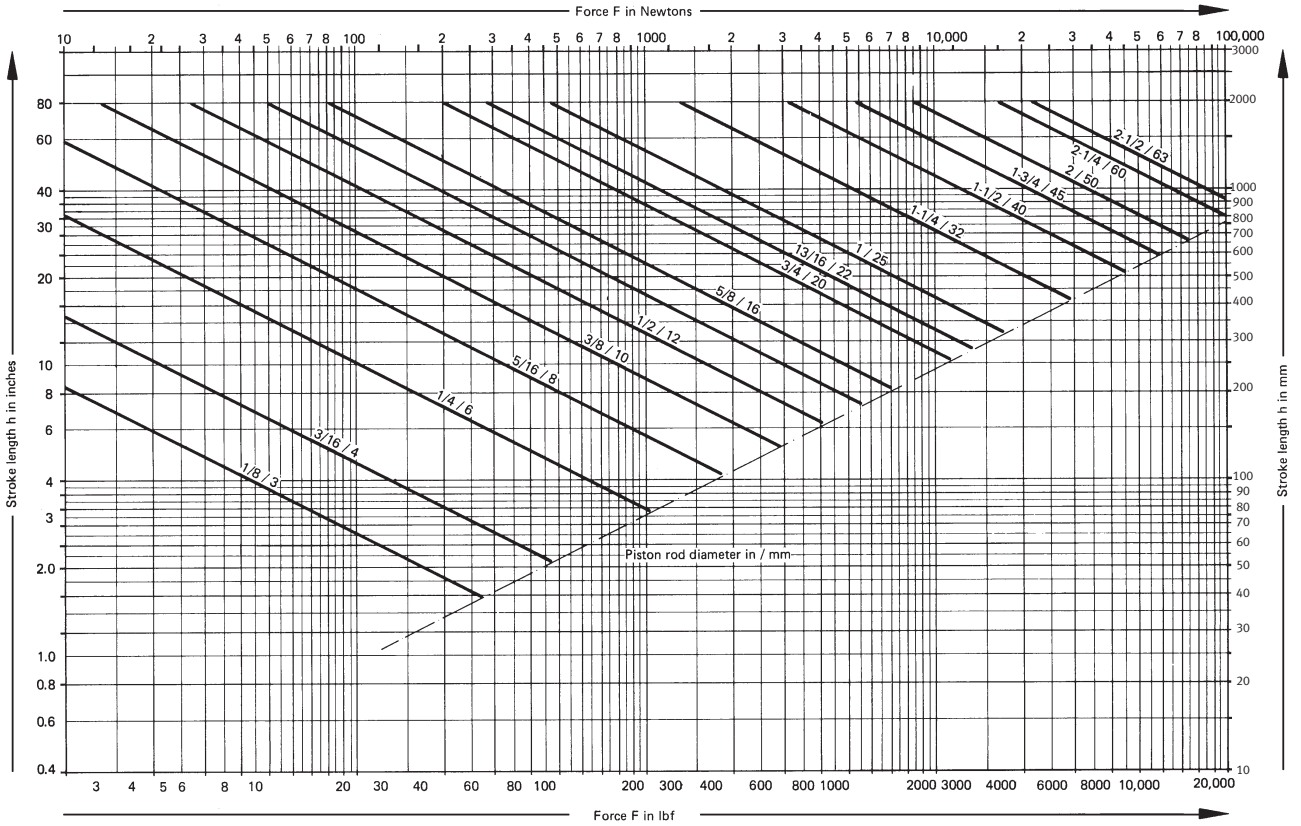
The type mounting which is most affected by buckling force is the pivotal mount. With other mountings, allowable load is approximately 50% greater.

Example:
Given a load of 90 lbf / 400 N
and a stroke of 12 in / 300 mm.

Find:
The minimum piston rod diameter for a DNC cylinder for this application?

Solution:
Locate F = 90 lbf / 400 N on the Buckling Load Diagram. Draw a vertical line to intersect the piston rod diameter plots. Now locate h = 12 in / 300 mm and draw a horizontal line to intersect the plots. The next largest piston rod diameter from the intersection of the vertical and horizontal lines is 3/8 in / 10 mm.

Therefore, we find from the catalog that a standard DNC-32-300-PPV-A cylinder (with a rod diameter of 12 mm) is suitable for this stroke and application.



Engineering

▶ Engineering Support ▷ Air Consumption and Quality

Actuators

Air Consumption Diagram

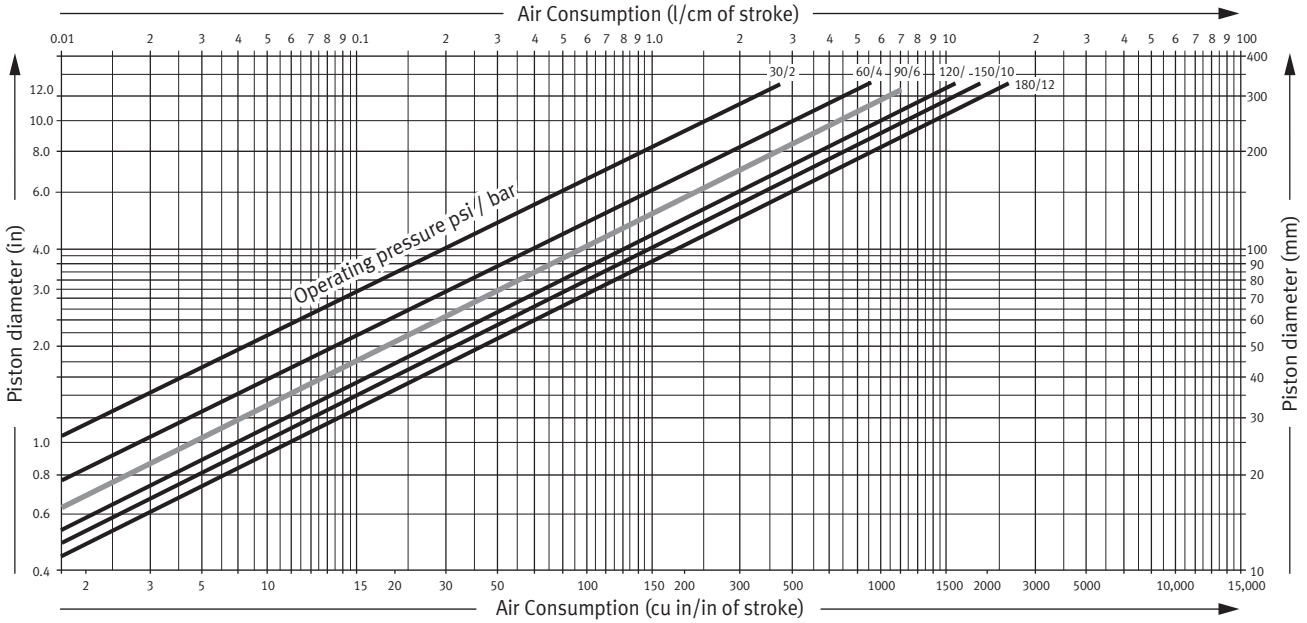
Air consumption is a part of the operating cost.
Consumption is shown in the diagram using the formula:

Example:
Cylinder DNC-50-500-PPV-A, piston dia. 50 mm, piston rod dia. 20 mm, stroke 500 mm, operating pressure 65 psi/4.5 bar.

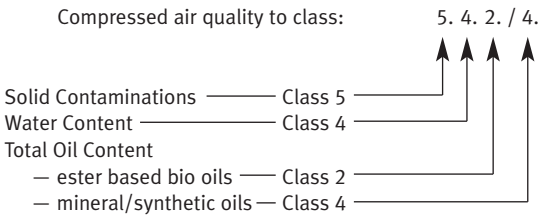
Find: Total Air Consumption per cycle?

Solution:
Locate the intersection of the selected piston dia. line with the operating pressure line. Air consumption can then be read off from the lower scale. The value thus obtained must then be multiplied by the stroke (in cm). The reading gives approx. 0.09 l/cm stroke x 50 cm stroke, corresponding to an air consumption for a single stroke of 4.5 l. For the return stroke, the volume of the piston rod must be subtracted from the stroke volume (20 mm dia. results in 0.014 l/cm stroke x 50 cm stroke = 0.7 liters). The return stroke air consumption is thus 3.8 liters and air consumption for the double stroke is 8.3 liters.

The air consumption values thus obtained are once again only approximate values as sometimes - especially in the case of higher numbers of strokes - not all the air is fully removed from pressure-filled areas, with the result that the actual air consumption may be considerably less.



Festo Standard Recommendation for Air Quality



Air Quality Classes in Accordance with ISO 8573

Class	Particle Size [µm]	Max. Particulate Density [mg/m³]	Pressure Dew Point [°C]	Max. Water Concentration [g/m³]	Max. Oil Concentration [mg/m³]
1	0.1	0.1	-70	0.003	0.01
2	1	1	-40	0.12	0.1
3	5	5	-20	0.88	1
4	15	8	3	6.0	5
5	40	10	7	7.8	25
6	–	–	10	9.4	–
7	–	–	Not specified	Not specified	–

Note: There are certain industries or applications where the quality of compressed air must be according to specific quality classes (e.g. pharmaceutical industry, medical industry, food industry and electronics industry).

Pneumatic Linear Actuators, Rotary Actuators, Grippers and Vacuum Components

Index

Linear Actuators

ADN 6
ADN-Q 12
ADVC 6
ADVU 6
ADVU-Inch 6
ADVUL 13
ADVULQ 12
ADVULQ - Inch 12
AEN 5
AEN-Q 11
AEVC 5
AEVU 5
AEVU - Inch 5
AEVULQ 11
AEVULQ - Inch 11
CDN 7, 9
CRDG 6, 9
CRDNG 6, 9
CRDNG - Inch 6, 9
CRDSNU 6, 9
CRDNSNU - Inch 6, 9
CRDSW 6, 9
CRDSW - Inch 6, 9
CRHD 6, 9
DFC 13
DFM 13
DFM-B 13
DFP 12
DGC 14
DGO 8
DGO - Inch 8
DGP 14
DGP - Inch 14
DLP 7, 9
DMM 6
DMML 13
DNA - Inch 6
DNC 6
DNC - Inch 6
DNC-Q 12
DNG 6
DNG - Inch 6
DNGL 12
DNGL - Inch 12
DPZ 12
DPZC 12
DSL 15, 17
DSNU 6
DSNU - Inch 6
DSNU-Q 12
DZF 12, 15
DZF - Inch 12, 15
DZH 12, 15
DZH - Inch 12, 15
EB 8
EBS 8
EG 5
EGZ 5
EMM 5
EMML 11
ESNU 5
ESNU - Inch 5
EV 8
EZH 11, 15
HMP 12
HMPL 13
HPV 15
HSP 15
MAS 8
SLE 13
SLF 13
SLG 14
SLM 14
SLS 13
SLT 13
SPZ 14
STA 7, 9

Rotary Actuators

DAPS 17
DRD 17
DRE 17
DRQ 17
DRQD 17
DSL 15, 17
DSM 17
DSR 17
DSR - Inch 17

Grippers and Vacuum Components

ESF 20
ESG 19
ESH 20
ESS/ESV 20
ESWA 20
FVAM 21
HGD 19
HGDS 19
HGP 19
HGPC 19
HGPL 19
HGPM 19
HGPP 19
HGPT 19
HGR 19
HGW 19
HGWM 19
ISV 21
U 21
VAD 20
VADM 20
VAD-M 20
VAK 20
VAM 21
VAS/VASB 20
VN 20

Index

Product Range

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