

PHD is a leading manufacturer of electric, pneumatic and hydraulic industrial automation actuators, designed to help companies across all industries optimise their manufacturing processes.

PHD's products consist of a full line of cylinders, escapements, grippers, linear slides, rotary actuators, clamps, multi-motion actuators, switches and sensors. These actuators provide the fundamental motion to push, pull, lift, rotate, turn, grip, reach, clamp, hold, position, escape, insert, load, unload, pick, place, and orient parts or materials in your manufacturing processes.

Applications include loading/unloading, assembly, packaging, workholding, positioning, material handling, orienting and feeding.



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**Grippers**



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# cylinders



CYLINDERS

SERIES	SIZE	MAX STROKE *		MAX FORCE †		MAJOR BENEFIT	INDUSTRY USE
		in	[mm]	lb	[N]		
<b>CRS (Compact)</b> page 1-5 	12	3-1/4	[80]	26	[113]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Optional shock pads extend cylinder life and minimize piston noise</li> <li>• Low profile</li> </ul>	<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Conveyors</li> <li>• Packaging</li> <li>• Assembly machines</li> <li>• General industrial automation</li> </ul>
	16	3-1/4	[80]	47	[201]		
	20	4	[100]	73	[314]		
	25	4	[100]	114	[491]		
	32	4-1/2	[115]	187	[804]		
	40	4-1/2	[115]	292	[1257]		
	50	5	[125]	456	[1964]		
63	7	[175]	725	[3117]			
<b>CTS</b> page 1-19 	12	2-1/2	[60]	26	[113]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Hard chrome plated guide shafts for anti-rotation &amp; increased side load capacity</li> <li>• Multiple mounting options</li> </ul>	<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Conveyors</li> <li>• Assembly machines</li> <li>• General industrial automation</li> <li>• Automotive</li> </ul>
	16	2-3/4	[70]	47	[201]		
	20	3-3/8	[85]	73	[314]		
	25	3-3/8	[85]	114	[491]		
	32	3-5/8	[90]	187	[804]		
	40	3-7/8	[95]	292	[1257]		
	50	3-3/4	[95]	456	[1964]		
63	6	[150]	725	[3117]			
<b>CV (ISO/VDMA)</b> page 1-29 	CVC20		[500]	73	[314]	<ul style="list-style-type: none"> <li>• ISO/VDMA interchangeable for easy mounting</li> <li>• PTFE wear ring &amp; built-in shock pads for long cylinder life</li> <li>• Rodlok® option for easy &amp; dependable locking of piston</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Material handling</li> <li>• Assembly machines</li> <li>• General industrial automation</li> </ul>
	CVC25		[500]	114	[491]		
	CVB20		[750]	73	[314]		
	CVB25		[750]	114	[491]		
	32		[1000]	187	[804]		
	40		[1000]	292	[1257]		
	50		[1000]	457	[1964]		
	63		[1000]	725	[3117]		
100		[1000]	1169	[5027]			
<b>AV, HV, A (NFPA)</b> 3/4", 1", & 1-1/8" page 1-53  	3/4" A, AV	12		66	[295]	<ul style="list-style-type: none"> <li>• Long life design for low maintenance</li> <li>• Repairable construction for extended life and long term savings</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
	1" A, AV	18		118	[524]		
	1-1/8" A, AV	18		149	[663]		
	3/4" HV	12		663	[2948]		
	1" HV	18		1178	[5240]		
	1-1/8" HV	18		1491	[6632]		
<b>AV, HV (NFPA)</b> 1-3/8" page 1-67  	1-3/8" AV	24		223	[991]	<ul style="list-style-type: none"> <li>• Long life design for low maintenance</li> <li>• Wide range of options for easy application and reduced design time</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
	1-3/8" HV	24		2227	[9907]		

**NOTES:**

- 1) \* Consult PHD for longer strokes.
- 2) † Maximum force is calculated at 150 psi [10.35 bar].

SERIES	SIZE	MAX STROKE * in [mm]	MAX FORCE † lb [N]	MAJOR BENEFIT	INDUSTRY USE	
CRS (Compact)		12	3-1/4 [80]	26 [113]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Optional shock pads extend cylinder life and minimize piston noise</li> <li>• Low profile</li> </ul>	<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Conveyors</li> <li>• Packaging</li> <li>• Assembly machines</li> <li>• General industrial automation</li> </ul>
		16	3-1/4 [80]	47 [201]		
		20	4 [100]	73 [314]		
		25	4 [100]	114 [491]		
		32	4-1/2 [115]	187 [804]		
		40	4-1/2 [115]	292 [1257]		
		50	5 [125]	456 [1964]		
63	7 [175]	725 [3117]				
CTS		12	2-1/2 [60]	26 [113]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Hard chrome plated guide shafts for anti-rotation &amp; increased side load capacity</li> <li>• Multiple mounting options</li> </ul>	<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Conveyors</li> <li>• Assembly machines</li> <li>• General industrial automation</li> <li>• Automotive</li> </ul>
		16	2-3/4 [70]	47 [201]		
		20	3-3/8 [85]	73 [314]		
		25	3-3/8 [85]	114 [491]		
		32	3-5/8 [90]	187 [804]		
		40	3-7/8 [95]	292 [1257]		
		50	3-3/4 [95]	456 [1964]		
63	6 [150]	725 [3117]				
CV (ISO/VDMA)		CVC20	[500]	73 [314]	<ul style="list-style-type: none"> <li>• ISO/VDMA interchangeable for easy mounting</li> <li>• PTFE wear ring &amp; built-in shock pads for long cylinder life</li> <li>• Rodlok® option for easy &amp; dependable locking of piston</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Material handling</li> <li>• Assembly machines</li> <li>• General industrial automation</li> </ul>
		CVC25	[500]	114 [491]		
		CVB20	[750]	73 [314]		
		CVB25	[750]	114 [491]		
		32	[1000]	187 [804]		
		40	[1000]	292 [1257]		
		50	[1000]	457 [1964]		
		63	[1000]	725 [3117]		
		80	[1000]	1169 [5027]		
		100	[1000]	1826 [7854]		
AV, HV, A (NFP A) 3/4", 1", & 1-1/8"		3/4" A, AV	12	66 [295]	<ul style="list-style-type: none"> <li>• Long life design for low maintenance</li> <li>• Repairable construction for extended life and long term savings</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
		1" A, AV	18	118 [524]		
		1-1/8" A, AV	18	149 [663]		
		3/4" HV	12	663 [2948]		
		1" HV	18	1178 [5240]		
		1-1/8" HV	18	1491 [6632]		
AV, HV (NFP A) 1-3/8"		1-3/8" AV	24	223 [991]	<ul style="list-style-type: none"> <li>• Long life design for low maintenance</li> <li>• Wide range of options for easy application and reduced design time</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
		1-3/8" HV	24	2227 [9907]		
TD (Air/Oil)		3/4" TD	6	125 [557]	<ul style="list-style-type: none"> <li>• Precise speed control and smooth operation at low velocities</li> <li>• Repairable construction for extended life and long term savings</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
		1" TD	9	224 [997]		
		1-1/8" TD	9	282 [1253]		
		1-3/8" TD	12	416 [1850]		
		3/4" TD -X or -C	6	66 [295]		
		1" TD -X or -C	9	118 [524]		
		1-1/8" TD -X or -C	9	149 [663]		
		1-3/8" TD -X or -C	12	223 [991]		
AV2, HV2, A2 (Back-to-Back)		3/4" A2, AV2	6	66 [295]	<ul style="list-style-type: none"> <li>• Long life design for low maintenance</li> <li>• Repairable construction for extended life and long term savings</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
		1" A2, AV2	9	118 [524]		
		1-1/8" A2, AV2	9	149 [663]		
		1-3/8" AV2	12	223 [991]		
		3/4" HV2	6	663 [2948]		
		1" HV2	9	1178 [5240]		
		1-1/8" HV2	9	1491 [6632]		
1-3/8" HV2	12	2227 [9907]				
A3V, H3V, A3 (Three Position)		3/4" A3, A3V	6	66 [295]	<ul style="list-style-type: none"> <li>• Long life design for low maintenance</li> <li>• Repairable construction for extended life and long term savings</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
		1" A3, A3V	9	118 [524]		
		1-1/8" A3, A3V	9	149 [663]		
		1-3/8" A3V	12	223 [991]		
		3/4" H3V	6	663 [2948]		
		1" H3V	9	1178 [5240]		
		1-1/8" H3V	9	1491 [6632]		
1-3/8" H3V	12	2227 [9907]				

**NOTES:**

- 1) \* Consult MVP for longer strokes.
- 2) † Maximum force is calculated at 150 psi [10.35 bar].



SERIES	MODEL	MAXIMUM STANDARD TRAVEL in [mm]	TYPICAL LOAD lb [N]	MAJOR BENEFITS	APPLICATION TYPE	INDUSTRY USE
STP (Profile Rail) pages 2-3 to 2-12	STPDx08	3 [75]	1-2 [4-8.9]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Smooth, precise rail bearing technology</li> <li>• Travel adjustment</li> <li>• Shock absorbers</li> </ul>		<ul style="list-style-type: none"> <li>• High speed automation</li> <li>• Precision assembly</li> <li>• Semiconductor</li> <li>• Assembly machine builders</li> <li>• Optical</li> <li>• Automotive</li> <li>• Material handling</li> </ul>
	STPDx12	4 [100]	2-4 [8.9-17.8]			
	STPDx16	5 [125]	4-8 [17.8-35.6]			
	STPDx20	6 [150]	8-16 [35.6-71.1]			
	STPDx25	6 [150]	16-32 [71.1-142.2]			
SHP (Rail) pages 2-13 to 2-18	SHPx08	1.57 [40]	0 - .84 [0 - 3.75]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Smooth, precise movement</li> <li>• Rail bearing technology</li> <li>• Travel adjustment &amp; shock pads</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Precision assembly equipment</li> <li>• Testing equipment</li> <li>• Life science</li> <li>• Semiconductor</li> <li>• Medical</li> </ul>
	SHPx12	1.57 [40]	.23 - 1.69 [1 - 7.5]			
	SHPx16	2.17 [55]	.34 - 2.53 [1.5 - 11.25]			
SIP (Rail) pages 2-19 to 2-24	SIP512	1.69 [50]	0 - 2.03 [0 - 9]	<ul style="list-style-type: none"> <li>• Very compact</li> <li>• Smooth, precise movement</li> <li>• Rail bearing technology</li> <li>• Travel adjustment &amp; shock pads</li> <li>• Low profile</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Precision assembly equipment</li> <li>• Testing equipment</li> <li>• Life science</li> <li>• Semiconductor</li> <li>• Medical</li> </ul>
	SIP516	2.953 [75]	.68 - 3.38 [3 - 15]			
	SIP520	2.953 [75]	.90 - 4.50 [4 - 20]			
SxL & SxH pages 2-25 to 2-34	SxL08/SxH08	1-1/2 [40]	.5 - 1 [2.2 - 4.5]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Lightweight</li> <li>• High side loads</li> <li>• Low cost</li> <li>• Travel adjustment &amp; shock pads</li> <li>• Industry standard</li> </ul>		<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Semiconductor</li> <li>• Assembly machine builders</li> <li>• Labeling equipment</li> <li>• Bearing manufacturing</li> <li>• Automotive</li> </ul>
	SxL10/SxH10	4 [40]	1 - 2 [4.5 - 8.9]			
	SxL14/SxH14	6 [40]	2 - 6 [8.9 - 26.7]			
	SxL20/SxH20	8 [75]	6 - 12 [26.7 - 53.4]			
	SxL25/SxH25	8 [75]	10 - 16 [45.5 - 71.2]			
SxL32/SxH32	8 [75]	12 - 25 [53.4 - 111]				
SD & SE pages 2-35 to 2-52	SDx22/SEx22	12.0 / 16.0	8 —	<ul style="list-style-type: none"> <li>• Wide variety of travels and sizes</li> <li>• Oversize shafts with PHD's rugged TC bushings provide excellent value</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Automotive</li> <li>• Labeling equipment</li> <li>• Packaging</li> <li>• Optical</li> <li>• Medical</li> <li>• General purpose</li> </ul>
	SDx23/SEx23	14.0 / 18.0	15 —			
	SDx24/SEx24	18.0 / 24.0	25 —			
	SDx25/SEx25	18.0 / 24.0	35 —			
	SDx26/SEx26	22.0 / 28.0	50 —			
SK & SL pages 2-53 to 2-70	SKx71/SLx71	[300 / 300]	— [30]	<ul style="list-style-type: none"> <li>• Wide variety of metric travels and sizes</li> <li>• Oversize shafts with PHD's rugged TC bushings</li> <li>• ISO cylinder compatible</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Automotive</li> <li>• Labeling equipment</li> <li>• Packaging</li> <li>• Optical</li> <li>• Medical</li> <li>• General purpose</li> </ul>
	SKx72/SLx72	[300 / 300]	— [35]			
	SKx73/SLx73	[300 / 450]	— [60]			
	SKx74/SLx74	[450 / 600]	— [90]			
	SKx75/SLx75	[450 / 600]	— [150]			
	SKx76/SLx76	[550 / 700]	— [250]			
SCV pages 2-71 to 2-80	SCVx2/SCVx3	6.0 [150]	8 / 15 [36/67]	<ul style="list-style-type: none"> <li>• Ideal for non-rotating vertical applications</li> <li>• Powered by rugged Series CV Cylinders</li> <li>• Available with Hushcontrol®</li> </ul>		<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Snack food</li> <li>• Assembly machine builders</li> </ul>
	SCVx4/SCVx5	8.0 [200]	25 / 35 [111/156]			
	SCVx6/SCVx7	10.0 [250]	50 / 75 [222/334]			
	SCVx8/SCVx9	12.0 [300]	100 / 150 [445/667]			

SEE THE NEXT PAGE FOR MORE SLIDES

SERIES	SIZE	MAX STROKE * in [mm]	MAX FORCE † lb [N]	MAJOR BENEFIT	INDUSTRY USE
<b>tom thumb</b> 	1-1/8" NPG	18	149 [663]	<ul style="list-style-type: none"> <li>• Long life design for low maintenance</li> <li>• Non-rotating rod, adjustable positions</li> <li>• Repairable construction for extended life and long term savings</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• General industrial automation</li> </ul>
	1-3/8" NPG	24	223 [991]		
	1-1/8" NHG	18	1491 [6632]		
	1-3/8" NHG	24	2227 [9907]		
<b>tom thumb</b> 	3/4" A, AV-O	12	66 [295]	<ul style="list-style-type: none"> <li>• Can be used in Class 100 Cleanroom applications</li> <li>• Vacuum port and special bushings offer rod protection</li> </ul>	<ul style="list-style-type: none"> <li>• Class 100 cleanroom</li> <li>• Food processing</li> <li>• Medical</li> <li>• Assembly machines</li> <li>• Machine loading/unloading</li> <li>• Semi-conductor</li> </ul>
	1" A, AV-O	18	118 [524]		
	1-1/8" A, AV-O	18	149 [663]		
<b>SFP Slide (Rodless Cylinder)</b> 	27	70.8 [1800]	MAX FORCE @ 110 psi [7.6 bar] 98 [435]	<ul style="list-style-type: none"> <li>• Space saving design</li> <li>• Smooth, precise movement</li> <li>• High load capacity with very low deflection</li> </ul>	<ul style="list-style-type: none"> <li>• General automation</li> <li>• Packaging</li> <li>• Assembly machine builders</li> <li>• Medical</li> <li>• Semiconductor</li> <li>• Optical</li> <li>• Plastics</li> <li>• Automotive</li> </ul>
	40	133.8 [3400]	215 [955]		

**NOTES:**

- 1) \* Maximum stroke (per cylinder 1 or 2) consult PHD for longer strokes.  
 2) † Maximum force calculated at 150 psi [10.35 bar].

**SEE THE PHD CLASSICS CATALOGUE FOR THE FOLLOWING PHD CYLINDERS:**

Series AS, AVS, & HVS Spherical Mount Cylinders

Series E Cylinder

Series NEAG and NEHG Cylinders (1-1/8" and 1-3/8" bores)

Series O Oval Cylinder



**Large Bore  
Low Profile**  
 Model# ML305098  
 Direct replacement  
 Incorporated PHD  
 designed bushing and  
 rod seals



**Diverter Cylinder**  
 Model# ML306345  
 Model# ML306554  
 Direct replacement  
 Available with  
 threaded mounting  
 holes



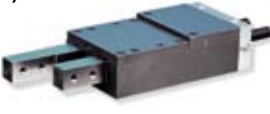
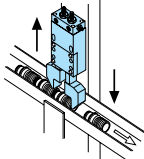

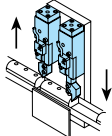
**ISO Cylinder  
with Head or Cap  
Mounted Trunnion**  
 Direct replacement  
 Head, cap, and tube  
 trunnion available



**Triple Power Weld  
Gun Cylinder**  
 Model# ML307938  
 Direct replacement  
 for weld gun cylinder  
 Improved non-rotating  
 design  
 Incorporates rod  
 scraper to handle  
 contaminants and  
 weld slag

# escapements



SERIES	MODEL	MAXIMUM STROKE in [mm]	TYPICAL LOAD lb [N]	MAJOR BENEFIT	APPLICATION TYPE	INDUSTRY USE
<b>160 (Double Rod)</b> pages 3-3 to 3-10 	02 [03]	.375 [10]	.5 [2.2]	• Ideal for isolating and feeding individual parts from vibrating feeders, magazines, hoppers or conveyors		• Material handling/conveyors • Automotive • Light bulb manufacturing • Optical
	12 [13]	.500 [12]	1.0 [4.4]			
	10, 14 [11, 15]	.500 [12]	1.5 [6.7]			
	22 [23]	.750 [20]	2.5 [11.1]			
	20, 24 [21, 25]	.750 [20]	4.0 [17.8]			
42 [43]	1.250 [32]	35 [155]				
<b>LC (Single Rod)</b> pages 3-11 to 3-16 	10	.394 [10]	.5 [2.2]	• Ideal for shot pin applications • Shock pad options reduce noise and minimize end of stroke shock		• Compact • Assembly machine builders • Automotive • Medical • Optical
	12	.472 [12]	1.0 [4.4]			
	20	.787 [20]	2.5 [11.1]			
	32	1.260 [32]	35 [155]			

ESCAPEMENTS



## unique solutions



**Heavy Duty Escapement**  
 Model# ML187550  
 35 mm bore heavy duty design for large loads  
 PHD LitStore CP020  
 page 3-17


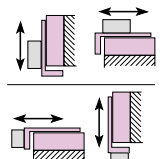

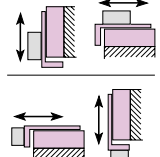

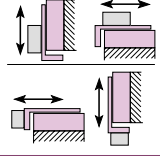

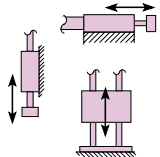

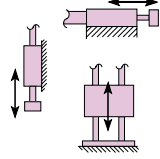

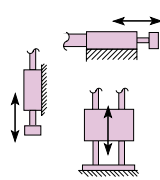

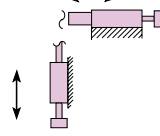

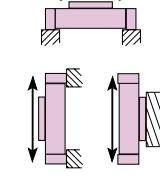

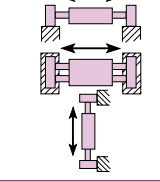

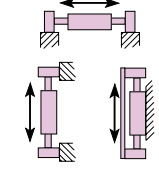


**Long Travel 3 Position Escapement**  
 Model# ML307421  
 100 mm travel with 25 mm mid-position  
 page 3-19













**Staging Stop**  
 Model# ML307537  
 8 mm bore  
 Locks when extended  
 page 3-21



SERIES	MODEL	MAXIMUM STANDARD TRAVEL in [mm]	TYPICAL LOAD lb [N]	MAJOR BENEFITS	APPLICATION TYPE	INDUSTRY USE	
STP (Profile Rail)		STPDx08	3 [75]	1-2 [4-8.9]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Smooth, precise rail bearing technology</li> <li>• Travel adjustment</li> <li>• Shock absorbers</li> </ul>		<ul style="list-style-type: none"> <li>• High speed automation</li> <li>• Precision assembly</li> <li>• Semiconductor</li> <li>• Assembly machine builders</li> <li>• Optical</li> <li>• Automotive</li> <li>• Material handling</li> </ul>
	STPDx12	4 [100]	2-4 [8.9-17.8]				
	STPDx16	5 [125]	4-8 [17.8-35.6]				
	STPDx20	6 [150]	8-16 [35.6-71.1]				
	STPDx25	6 [150]	16-32 [71.1-142.2]				
SHP (Rail)		SHPx08	1.57 [40]	0-.84 [0-3.75]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Smooth, precise movement</li> <li>• Rail bearing technology</li> <li>• Travel adjustment &amp; shock pads</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Precision assembly equipment</li> <li>• Testing equipment</li> <li>• Life science</li> <li>• Semiconductor</li> <li>• Medical</li> </ul>
	SHPx12	1.57 [40]	.23 - 1.69 [1 - 7.5]				
	SHPx16	2.17 [55]	.34 - 2.53 [1.5 - 11.25]				
SIP (Rail)		SIP512	1.69 [50]	0-2.03 [0-9]	<ul style="list-style-type: none"> <li>• Very compact</li> <li>• Smooth, precise movement</li> <li>• Rail bearing technology</li> <li>• Travel adjustment &amp; shock pads</li> <li>• Low profile</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Precision assembly equipment</li> <li>• Testing equipment</li> <li>• Life science</li> <li>• Semiconductor</li> <li>• Medical</li> </ul>
	SIP516	2.953 [75]	.68 - 3.38 [3 - 15]				
	SIP520	2.953 [75]	.90 - 4.50 [4 - 20]				
SxL & SxH		SxL08/SxH08	1-1/2 [40]	.5 - 1 [2.2 - 4.5]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Lightweight</li> <li>• High side loads</li> <li>• Low cost</li> <li>• Travel adjustment &amp; shock pads</li> <li>• Industry standard</li> </ul>		<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Semiconductor</li> <li>• Assembly machine builders</li> <li>• Labeling equipment</li> <li>• Bearing manufacturing</li> <li>• Automotive</li> </ul>
	SxL10/SxH10	4 [40]	1 - 2 [4.5 - 8.9]				
	SxL14/SxH14	6 [40]	2 - 6 [8.9 - 26.7]				
	SxL20/SxH20	8 [75]	6 - 12 [26.7 - 53.4]				
	SxL25/SxH25	8 [75]	10 - 16 [45.5 - 71.2]				
SD & SE		SDx22/SEx22	12.0 / 16.0	8 —	<ul style="list-style-type: none"> <li>• Wide variety of travels and sizes</li> <li>• Oversize shafts with PHD's rugged TC bushings provide excellent value</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Automotive</li> <li>• Labeling equipment</li> <li>• Packaging</li> <li>• Optical</li> <li>• Medical</li> <li>• General purpose</li> </ul>
SDx23/SEx23	14.0 / 18.0	15 —					
SDx24/SEx24	18.0 / 24.0	25 —					
SDx25/SEx25	18.0 / 24.0	35 —					
SDx26/SEx26	22.0 / 28.0	50 —					
SK & SL		SKx71/SLx71	[300 / 300]	— [30]	<ul style="list-style-type: none"> <li>• Wide variety of metric travels and sizes</li> <li>• Oversize shafts with PHD's rugged TC bushings</li> <li>• ISO cylinder compatible</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Automotive</li> <li>• Labeling equipment</li> <li>• Packaging</li> <li>• Optical</li> <li>• Medical</li> <li>• General purpose</li> </ul>
	SKx72/SLx72	[300 / 300]	— [35]				
	SKx73/SLx73	[300 / 450]	— [60]				
	SKx74/SLx74	[450 / 600]	— [90]				
	SKx75/SLx75	[450 / 600]	— [150]				
	SKx76/SLx76	[550 / 700]	— [250]				
SCV		SCVx2/SCVx3	6.0 [150]	8 / 15 [36/67]	<ul style="list-style-type: none"> <li>• Ideal for non-rotating vertical applications</li> <li>• Powered by rugged Series CV Cylinders</li> <li>• Available with Hushcontrol</li> </ul>		<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Snack food</li> <li>• Assembly machine builders</li> </ul>
	SCVx4/SCVx5	8.0 [200]	25 / 35 [111/156]				
	SCVx6/SCVx7	10.0 [250]	50 / 75 [222/334]				
	SCVx8/SCVx9	12.0 [300]	100 / 150 [445/667]				
SFP (Rodless-Enclosed)		SFP527	70.8 [1800]	0 - 100 [0 - 440]	<ul style="list-style-type: none"> <li>• Space saving design</li> <li>• Smooth, precise movement</li> <li>• High load capacity with very low deflection</li> </ul>		<ul style="list-style-type: none"> <li>• General automation</li> <li>• Packaging</li> <li>• Assembly machine builders</li> <li>• Medical</li> <li>• Semiconductor</li> <li>• Optical</li> <li>• Plastics</li> <li>• Automotive</li> </ul>
	SFP540	133.8 [3400]	20 - 250 [89 - 1100]				
SM (Dual Bore)		SMxx08	3 [75]	.5 - 2 [2 - 9]	<ul style="list-style-type: none"> <li>• Long life</li> <li>• Increased stopping capability</li> <li>• Full range of travel adjustment</li> <li>• Low cost</li> </ul>		<ul style="list-style-type: none"> <li>• Optical</li> <li>• Medical</li> <li>• Life science</li> <li>• Cosmetic</li> <li>• Light bulb</li> <li>• Assembly machine builders</li> <li>• Semiconductor</li> </ul>
	SMxx12	4 [100]	2 - 8 [9 - 35]				
	SMxx16	5 [125]	8 - 15 [35 - 67]				
	SMxx25	6 [150]	15 - 35 [67 - 155]				
	SMxx32	6 [150]	35 - 70 [155 - 311]				
SG		SGxx1	12.0 [305]	40 [178]	<ul style="list-style-type: none"> <li>• Long travel</li> <li>• Highest load capacity saddle type slide</li> <li>• Lowest cost per travel length and load</li> </ul>		<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Material handling</li> <li>• Optical</li> <li>• Automotive</li> </ul>
	SGxx2	12.0 [305]	50 [222]				
	SGxx3	16.0 [405]	65 [289]				
	SGxx4	20.0 [510]	160 [712]				
	SGxx5	24.0 [610]	300 [1334]				
	SGxx6	36.0 [915]	500 [2224]				

# grippers parallel



SERIES	SIZE	GRIP FORCE* lb [N]	NOMINAL TOTAL JAW TRAVEL in [mm]	MAJOR BENEFITS	INDUSTRY USE		
<b>GRS</b> pages 4-11		27x4.5	68 [302]	.177 [4.5]	<ul style="list-style-type: none"> <li>• low profile</li> <li>• high grip force</li> <li>• pneumatic service</li> <li>• switches</li> <li>• five sizes</li> <li>• spring assist</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Robotics</li> <li>• Cosmetics</li> <li>• Plumbing fixtures</li> <li>• Vehicle lighting equipment</li> </ul>	
		27x7	48 [213]	.276 [7]			
		28x6	77 [341]	.250 [6]			
		28x10	48 [213]	.394 [10]			
		32x8	109 [485]	.315 [8]			
		32x13	70 [310]	.512 [13]			
		50x19	235 [1045]	.750 [19]			
		50x28	157 [697]	1.102 [28]			
	63x32	398 [1770]	1.260 [32]				
	63x44	289 [1287]	1.732 [44]				
<b>GRD</b> pages 4-21		SHORT JAW TRAVEL:			<ul style="list-style-type: none"> <li>• small size</li> <li>• pneumatic service</li> <li>• high grip force</li> <li>• two jaw travels</li> <li>• spring assist</li> <li>• switches</li> <li>• low cost</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Cosmetics</li> <li>• Batteries</li> <li>• Light bulb manufacturing</li> <li>• Plumbing fixtures</li> </ul>	
		3	33 [147]	.187 [4.75]			
		4	40 [178]	.335 [8.5]			
		5	87 [387]	.315 [8.0]			
		6	136 [604]	.423 [10.75]			
		LONG JAW TRAVEL:					
		5	54 [240]	.502 [12.75]			
		6	91 [406]	.699 [17.75]			
<b>GRW</b> pages 4-31		16	36 [160]	0.79 [20]	<ul style="list-style-type: none"> <li>• long travel</li> <li>• superior jaw stability</li> <li>• high performance</li> <li>• long tooling lengths</li> <li>• simple to use</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Powdered metal</li> <li>• Bearing manufacturing</li> <li>• Automotive</li> </ul>	
		25	90 [400]	2.09 [53]			
		32	170 [756]	2.56 [65]			
		40	207 [921]	3.58 [91]			
		50	429 [1908]	4.61 [117]			
<b>GRC (with SHURGRIP option)</b> pages 4-39		3	96 [427]	1.00 [25.5]	<ul style="list-style-type: none"> <li>• long travel</li> <li>• pneumatic service</li> <li>• high grip force</li> <li>• locking feature</li> <li>• spring assist</li> <li>• switches</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Automotive</li> <li>• Batteries</li> <li>• Robotics</li> </ul>	
		4	209 [930]	1.53 [39]			
		5	383 [1704]	2.00 [51]			
		6	870 [3870]	3.07 [78]			
<b>GRT (3 Jaw)</b> pages 4-51		1	44 [196]	▲ 0.236 [6]	<ul style="list-style-type: none"> <li>• very low profile</li> <li>• pneumatic service</li> <li>• eight sizes</li> <li>• high grip force</li> <li>• switches</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Light bulb manufacturing</li> <li>• Packaging</li> <li>• Automotive</li> <li>• Golf equipment</li> <li>• Robotics</li> </ul>	
		2	112 [499]	▲ 0.315 [8]			
		3	168 [747]	▲ 0.472 [12]			
		4	218 [971]	▲ 0.630 [16]			
		5	378 [1683]	▲ 0.787 [20]			
		6	569 [2531]	▲ 1.024 [26]			
		7	880 [3912]	▲ 1.260 [32]			
		8	1452 [6459]	▲ 1.575 [40]			
<b>GRL</b> pages 4-61		14x7	28 [124]	0.28 [7]	<ul style="list-style-type: none"> <li>• long travel</li> <li>• pneumatic service</li> <li>• slim profile</li> <li>• switches</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Light bulb manufacturing</li> <li>• Packaging</li> </ul>	
		14x13	30 [132]	0.51 [13]			
		16x20	41 [182]	0.79 [20]			
		16x26	41 [182]	1.02 [26]			
<b>GRF</b> pages 4-69		19x4.5	30 [135]	.177 [4.5]	<ul style="list-style-type: none"> <li>• low profile</li> <li>• high grip force</li> <li>• pneumatic service</li> <li>• four sizes</li> <li>• two jaw travels</li> <li>• three jaw styles</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Light bulb manufacturing</li> <li>• Robotics</li> </ul>	
		25x6.5	35 [156]	.256 [6.5]			
		28x6	77 [341]	.250 [6]			
		28x10	48 [213]	.394 [10]			
		32x8	116 [516]	.315 [8]			
		32x13	85 [378]	.512 [13]			
<b>190, 191</b> pages 4-77		SHORT JAW TRAVEL: STYLE 1 & 2			<ul style="list-style-type: none"> <li>• small size</li> <li>• pneumatic service</li> <li>• two jaw travels</li> <li>• two jaw styles</li> <li>• spring assist</li> <li>• switches</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Light bulb manufacturing</li> <li>• Vehicle lighting equipment</li> <li>• Medical</li> <li>• Batteries</li> <li>• Bearing manufacturing</li> </ul>	
		6	5.3 [24]	.157 [4]			
		7	10.6 [47]	.276 [7]			
		8	21.8 [97]	.394 [10]			
		9	42.6 [190]	.512 [13]			
		LONG JAW TRAVEL: STYLE 2					
		6	3.2 [14]	.315 [8]			
		7	8.1 [36]	.433 [11]			
		8	13.1 [58]	.630 [16]			
		9	23.5 [105]	.866 [22]			
<b>5300</b> pages 4-87		6	128 [570]	.62 [15.8]	<ul style="list-style-type: none"> <li>• heavy duty construction</li> <li>• pneumatic service</li> <li>• high grip force</li> <li>• spring assist</li> <li>• switches</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Robotics</li> <li>• Material handling</li> </ul>	
		7	261 [1164]	1.00 [25.4]			
		8	488 [2172]	1.31 [33.3]			
		9	980 [4356]	1.80 [45.8]			
<b>GRR</b> pages 4-91			63x150	704 [3131]	5.906 [150]	<ul style="list-style-type: none"> <li>• wide range of jaw travel</li> <li>• high capacity</li> <li>• narrow width</li> <li>• rugged design</li> <li>• low jaw deflection</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Robotics</li> <li>• Material handling</li> </ul>
			63x200		7.874 [200]		
			63x250		9.843 [250]		
			63x250		13.780 [350]		

▲ Represents the change in jaw movement as a diameter change.

SEE NEXT PAGE FOR ANGULAR GRIPPERS AND NOTES





SERIES	MODEL	MAXIMUM STROKE in [mm]	TYPICAL LOAD lb [N]	MAJOR BENEFIT	APPLICATION TYPE	INDUSTRY USE
160 (Double Rod)	02 [03]	.375 [10]	.5 [2.2]	<ul style="list-style-type: none"> <li>• Ideal for isolating and feeding individual parts from vibrating feeders, magazines, hoppers or conveyors</li> </ul>		<ul style="list-style-type: none"> <li>• Material handling/conveyors</li> <li>• Automotive</li> <li>• Light bulb manufacturing</li> <li>• Optical</li> </ul>
	12 [13]	.500 [12]	1.0 [4.4]			
	10, 14 [11, 15]	.500 [12]	1.5 [6.7]			
	22 [23]	.750 [20]	2.5 [11.1]			
	20, 24 [21, 25]	.750 [20]	4.0 [17.8]			
42 [43]	1.250 [32]	35 [155]				
LC (Single Rod)	10	.394 [10]	.5 [2.2]	<ul style="list-style-type: none"> <li>• Ideal for shot pin applications</li> <li>• Shock pad options reduce noise and minimize end of stroke shock</li> </ul>		<ul style="list-style-type: none"> <li>• Compact</li> <li>• Assembly machine builders</li> <li>• Automotive</li> <li>• Medical</li> <li>• Optical</li> </ul>
	12	.472 [12]	1.0 [4.4]			
	20	.787 [20]	2.5 [11.1]			
	32	1.260 [32]	35 [155]			

## phd Unlimited™

UNIQUE SOLUTIONS



**Heavy Duty Escapement**

Model# ML187550

35 mm bore heavy duty design for large loads

PHD LitStore CP020



**Long Travel 3 Position Escapement**

Model# ML307421

100 mm travel with 25 mm mid-position



**Staging Stop**

Model# ML307537

8 mm bore

Locks when extended







# rotary actuators



SERIES	SIZE	MAXIMUM TORQUE OUTPUT	MAJOR BENEFIT	APPLICATION	INDUSTRY USE
<b>RCC (Cable)</b> page 5-3 	8 mm 12 mm 16 mm	1.8 to 13.7 in-lb at 100 psi [.20 to 1.55 Nm at 7 bar]	<ul style="list-style-type: none"> <li>• low cost</li> <li>• compact size</li> <li>• low profile</li> <li>• high thrust loads</li> </ul>	<ul style="list-style-type: none"> <li>• Part rotation</li> <li>• Electronic assembly                             <ul style="list-style-type: none"> <li>• Labeling</li> <li>• Grip &amp; flip</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Electronics</li> <li>• Packaging</li> <li>• Assembly machine</li> </ul>
<b>RF (Low Profile)</b> page 5-9 	14 mm - 25 mm	7 to 67 in-lb at 100 psi [0.8 to 7.7 Nm at 7 bar]	<ul style="list-style-type: none"> <li>• compact size</li> <li>• low profile</li> <li>• one piece hub &amp; piston assembly</li> <li>• fully adjustable stops</li> <li>• modularity with SHP &amp; GRT</li> </ul>	<ul style="list-style-type: none"> <li>• Part orientation</li> <li>• Sensing</li> <li>• Turntables</li> </ul>	<ul style="list-style-type: none"> <li>• Electronics</li> <li>• Packaging</li> <li>• Assembly machine</li> </ul>
<b>RL</b> page 5-19 	12 mm - 63 mm	4.4 to 544 in-lb at 150 psi [.5 to 59.4 Nm at 10 bar]	<ul style="list-style-type: none"> <li>• low cost</li> <li>• OEM style rotaries</li> <li>• high radial axial bearing loads</li> <li>• high torque/package size</li> </ul>	<ul style="list-style-type: none"> <li>• Turntables</li> <li>• Machine load/unload</li> <li>• Label application</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Machine builders</li> <li>• General industrial use</li> <li>• Labeling/packaging</li> </ul>
<b>RA</b> page 5-31 	20 mm - 50 mm	14 to 228 in-lb at 150 psi [1.6 to 24.9 Nm at 10 bar]	<ul style="list-style-type: none"> <li>• full featured rotary</li> <li>• high radial axial bearing loads</li> <li>• zero backlash at ends of rotation</li> <li>• wide variety of options &amp; accessories</li> </ul>	<ul style="list-style-type: none"> <li>• Turntables</li> <li>• Part orientation</li> <li>• Machine load/unload</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Machine OEM's</li> <li>• General industrial use</li> </ul>
<b>RI</b> page 5-41 	25 mm - 50 mm	37 to 476 in-lb at 100 psi [4.3 to 54.6 Nm at 7 bar]	<ul style="list-style-type: none"> <li>• high torque</li> <li>• high axial &amp; radial bearing load</li> <li>• thru hole shaft for built-in air communication ports</li> </ul>	<ul style="list-style-type: none"> <li>• Part orientation</li> <li>• Pick &amp; place</li> <li>• Machine load/unload</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General machine builders</li> <li>• Electronics</li> <li>• Stamping</li> </ul>
<b>1000-8000</b> page 5-57 	1 in - 3 in	<b>Pneumatic:</b> 58 to 3,180 in-lb @ 150 psi [6.4 to 347 Nm @ 10 bar] <b>Hydraulic:</b> 585 to 31,800 in-lb @ 1500 psi [66 to 3579 Nm @ 103 bar]	<ul style="list-style-type: none"> <li>• heavy duty</li> <li>• wide variety of options &amp; accessories</li> <li>• versatile design</li> <li>• high torque</li> </ul>	<ul style="list-style-type: none"> <li>• Pneumatic or Hydraulic</li> <li>• General purpose rotary application</li> <li>• Machine load/unload</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General machine builders</li> </ul>
<b>AIR/OIL TANDEM 2000-8000</b> page 5-69 	1 in - 3 in	58 to 1,590 in-lb @ 150 psi [6.4 to 174 Nm @ 10 bar]	<ul style="list-style-type: none"> <li>• smooth rotation throughout rotation</li> <li>• controlled velocity</li> </ul>	<ul style="list-style-type: none"> <li>• Machine load/unload                             <ul style="list-style-type: none"> <li>• Turntable</li> <li>• Pick &amp; place</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General industrial machines</li> </ul>
<b>MULTI-POSITION 2000-8000</b> page 5-81 	1 in - 3 in	<b>Pneumatic:</b> 58 to 1,590 in-lb @ 150 psi [6.4 to 174 Nm @ 10 bar] <b>Hydraulic:</b> 585 to 15,900 in-lb @ 1500 psi [66 to 1789 Nm @ 103 bar]	<ul style="list-style-type: none"> <li>• 3, 4, or 5 rotary positions</li> </ul>	<ul style="list-style-type: none"> <li>• Machine load/unload                             <ul style="list-style-type: none"> <li>• Pick &amp; place</li> <li>• Part orientation</li> <li>• Reject/accept station</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General industrial machines</li> </ul>

ROTARY ACTUATORS



SERIES	SIZE	GRIP FORCE* lb [N]	NOMINAL TOTAL JAW TRAVEL in [mm]	MAJOR BENEFITS	INDUSTRY USE
GRS 	27x4.5	68 [302]	.177 [4.5]	<ul style="list-style-type: none"> <li>low profile</li> <li>high grip force</li> <li>pneumatic service</li> <li>switches</li> <li>five sizes</li> <li>spring assist</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Robotics</li> <li>Cosmetics</li> <li>Plumbing fixtures</li> <li>Vehicle lighting equipment</li> </ul>
	27x7	48 [213]	.276 [7]		
	28x6	77 [341]	.250 [6]		
	28x10	48 [213]	.394 [10]		
	32x8	109 [485]	.315 [8]		
	32x13	70 [310]	.512 [13]		
	50x19	235 [1045]	.750 [19]		
	50x28	157 [697]	1.102 [28]		
	63x32	398 [1770]	1.260 [32]		
GRD 	SHORT JAW TRAVEL:			<ul style="list-style-type: none"> <li>small size</li> <li>pneumatic service</li> <li>high grip force</li> <li>two jaw travels</li> <li>spring assist</li> <li>switches</li> <li>low cost</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Cosmetics</li> <li>Batteries</li> <li>Light bulb manufacturing</li> <li>Plumbing fixtures</li> </ul>
	3	33 [147]	.187 [4.75]		
	4	40 [178]	.335 [8.5]		
	5	87 [387]	.315 [8.0]		
	6	136 [604]	.423 [10.75]		
	LONG JAW TRAVEL:				
	5	54 [240]	.502 [12.75]		
	6	91 [406]	.699 [17.75]		
GRW 	16	36 [160]	0.79 [20]	<ul style="list-style-type: none"> <li>long travel</li> <li>superior jaw stability</li> <li>high performance</li> <li>long tooling lengths</li> <li>simple to use</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Powdered metal</li> <li>Bearing manufacturing</li> <li>Automotive</li> </ul>
	25	90 [400]	2.09 [53]		
	32	170 [756]	2.56 [65]		
	40	207 [921]	3.58 [91]		
	50	429 [1908]	4.61 [117]		
GRC (with SHURGRIP option) 	3	96 [427]	1.00 [25.5]	<ul style="list-style-type: none"> <li>long travel</li> <li>pneumatic service</li> <li>high grip force</li> <li>locking feature</li> <li>spring assist</li> <li>switches</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Automotive</li> <li>Batteries</li> <li>Robotics</li> </ul>
	4	209 [930]	1.53 [39]		
	5	383 [1704]	2.00 [51]		
	6	870 [3870]	3.07 [78]		
GRT (3 Jaw)  <small>Represents the change in jaw movement as a diameter change.</small>	1	44 [196]	0.236 [6]	<ul style="list-style-type: none"> <li>very low profile</li> <li>pneumatic service</li> <li>eight sizes</li> <li>high grip force</li> <li>switches</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Light bulb manufacturing</li> <li>Packaging</li> <li>Automotive</li> <li>Golf equipment</li> <li>Robotics</li> </ul>
	2	112 [499]	0.315 [8]		
	3	168 [747]	0.472 [12]		
	4	218 [971]	0.630 [16]		
	5	378 [1683]	0.787 [20]		
	6	569 [2531]	1.024 [26]		
	7	880 [3912]	1.260 [32]		
	8	1452 [6459]	1.575 [40]		
GRL 	14x7	28 [124]	0.28 [7]	<ul style="list-style-type: none"> <li>long travel</li> <li>pneumatic service</li> <li>slim profile</li> <li>switches</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Light bulb manufacturing</li> <li>Packaging</li> </ul>
	14x13	30 [132]	0.51 [13]		
	16x20	41 [182]	0.79 [20]		
	16x26	41 [182]	1.02 [26]		
GRF 	19x4.5	30 [135]	.177 [4.5]	<ul style="list-style-type: none"> <li>low profile</li> <li>high grip force</li> <li>pneumatic service</li> <li>four sizes</li> <li>two jaw travels</li> <li>three jaw styles</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Light bulb manufacturing</li> <li>Robotics</li> </ul>
	25x6.5	35 [156]	.256 [6.5]		
	28x6	77 [341]	.250 [6]		
	28x10	48 [213]	.394 [10]		
	32x8	116 [516]	.315 [8]		
	32x13	85 [378]	.512 [13]		
190, 191 	SHORT JAW TRAVEL: STYLE 1 & 2			<ul style="list-style-type: none"> <li>small size</li> <li>pneumatic service</li> <li>two jaw travels</li> <li>two jaw styles</li> <li>spring assist</li> <li>switches</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Light bulb manufacturing</li> <li>Vehicle lighting equipment</li> <li>Medical</li> <li>Batteries</li> <li>Bearing manufacturing</li> </ul>
	6	5.3 [24]	.157 [4]		
	7	10.6 [47]	.276 [7]		
	8	21.8 [97]	.394 [10]		
	9	42.6 [190]	.512 [13]		
	LONG JAW TRAVEL: STYLE 2				
	6	3.2 [14]	.315 [8]		
	7	8.1 [36]	.433 [11]		
	8	13.1 [58]	.630 [16]		
9	23.5 [105]	.866 [22]			
5300 	6	128 [570]	.62 [15.8]	<ul style="list-style-type: none"> <li>heavy duty construction</li> <li>pneumatic service</li> <li>high grip force</li> <li>spring assist</li> <li>switches</li> </ul>	<ul style="list-style-type: none"> <li>Automotive</li> <li>Robotics</li> <li>Material handling</li> </ul>
	7	261 [1164]	1.00 [25.4]		
	8	488 [2172]	1.31 [33.3]		
	9	980 [4356]	1.80 [45.8]		
GRR  <b>GUARDIAN GRIPPER</b>	63x150	704 [3131]	5.906 [150]	<ul style="list-style-type: none"> <li>wide range of jaw travel</li> <li>high capacity</li> <li>narrow width</li> <li>rugged design</li> <li>low jaw deflection</li> </ul>	<ul style="list-style-type: none"> <li>Assembly machine builders</li> <li>Robotics</li> <li>Material handling</li> </ul>
	63x200		7.874 [200]		
	63x250		9.843 [250]		
	63x250		13.780 [350]		

# clamps



SERIES	SIZE	MAX STROKE	MAX FORCE * lb [N]	MAJOR BENEFIT	INDUSTRY USE	
<b>PA (Swing Arm)</b> pages 7-3		2	1.043 [26.5]	46 [204]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• 5 sizes</li> <li>• Multiple mounting surfaces</li> <li>• Left and right rotations</li> <li>• Steel and copper arms</li> <li>• Switch ready</li> </ul>	<ul style="list-style-type: none"> <li>• Welding</li> <li>• Machining</li> <li>• Assembly</li> <li>• General industrial automation</li> </ul>
		3	1.181 [30]	82 [365]		
		4	1.181 [30]	143 [636]		
		5	1.161 [29.5]	223 [992]		
		6	1.181 [30]	378 [1682]		
<b>PB (Swing Arm)</b> page 7-7		S2	0.768 [19.5]	45 [200]	<ul style="list-style-type: none"> <li>• 4 sizes with 8 strokes</li> <li>• Left and right rotations</li> <li>• Rod weld cover available</li> <li>• Anti-backlash arm and guide available</li> <li>• Switch ready on 4 sides of clamp</li> </ul>	<ul style="list-style-type: none"> <li>• Welding</li> <li>• Machining</li> <li>• Assembly</li> <li>• General industrial automation</li> </ul>
		L2	1.161 [29.5]	45 [200]		
		S3	0.984 [25]	73 [325]		
		L3	1.378 [35]	73 [325]		
		S4	0.984 [25]	143 [636]		
		L4	1.378 [35]	143 [636]		
S5	1.535 [39]	223 [992]				
L5	2.717 [69]	223 [992]				
<b>PNC NumberCruncher®</b> page 7-13			<b>MAX OPENING</b>		<ul style="list-style-type: none"> <li>• High force</li> <li>• Standard characters</li> <li>• Operates within .5 sec</li> <li>• Quiet operation</li> </ul>	<ul style="list-style-type: none"> <li>• Numbering parts in steel, aluminum, copper, brass, plastic and leather</li> </ul>
		44	16°	9005 [40056]		
		55 55-B01	16°	14790 [65790] 25404 [113000]		
<b>PHL (Die Lifter)</b> page 7-21			<b>MAX STROKE</b>		<ul style="list-style-type: none"> <li>• Available as drop-in replacement for General Motors Global Die Standards (GMGDS) 90.35.05-A and B</li> <li>• Built-in rod compliance eliminates side load on piston rod, thus increasing cylinder life</li> <li>• Composite bearings with internal lubrication for long life</li> </ul>	<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Automotive</li> <li>• General industrial automation</li> </ul>
		6	1.969 [50]	420 [1870]		
			3.150 [80]			
			3.937 [100]			
			4.921 [125]			
			6.299 [160]			
	7.874 [200]					
<b>PEC (Arm Over)</b> page 7-25			<b>CLAMP TORQUE</b>	<b>MAX HOLDING TORQUE</b>	<ul style="list-style-type: none"> <li>• Superior part holding</li> <li>• Widest range of high clamping force in its class</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly</li> <li>• Welding</li> </ul>
		33	225 [25]	1593 [180]		
34	400 [45]	1593 [180]				
<b>PLK (Pin Locating)</b> page 7-29			<b>CLAMP FORCE</b>	<b>CLAMP FORCE FACTOR C1</b>	<ul style="list-style-type: none"> <li>• Ideal for part clamping in weld areas</li> <li>• Completely enclosed finger/pin</li> <li>• Available in pin diameters from 12.5 to 24.5 mm diameter</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly</li> <li>• Welding</li> </ul>
		505	223 [991]	2.56 [165]		
510	223 [991]	2.56 [165]				

\*Maximum force is calculated at 87 psi [6 bar].



SERIES	SIZE	GRIP FORCE** lb [N]	MINIMUM DISTANCE** in [mm]	MAJOR BENEFITS	INDUSTRY USE	
8400		0	11.7 [52]	.20 [5.1]	<ul style="list-style-type: none"> <li>• small size</li> <li>• pneumatic service</li> <li>• spring assist</li> <li>• switches</li> <li>• low cost</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Light bulb manufacturing</li> <li>• Batteries</li> </ul>
		1	19.7 [88]	.30 [7.6]		
		2	55 [244]	.40 [10]		
		3	81 [359]	.62 [16]		
GRB (180 )		12	13 [57]	.44 [11.3]	<ul style="list-style-type: none"> <li>• robust cam design</li> <li>• pneumatic service</li> <li>• three jaw rotations available</li> <li>• compatible with PHD solid state, reed &amp; proximity switches</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Light bulb manufacturing</li> <li>• Medical</li> <li>• Batteries</li> <li>• Bearing manufacturing</li> <li>• Semiconductor</li> </ul>
		16	28 [124]	.56 [14.3]		
		20	79 [353]	.67 [17.0]		
		32	179 [797]	.92 [23.4]		
		40	265 [1180]	1.21 [30.8]		
		50	549 [2443]	1.90 [48.3]		
5300		2	201 [894]	.81 [21]	<ul style="list-style-type: none"> <li>• heavy duty construction</li> <li>• pneumatic service</li> <li>• high grip force</li> <li>• spring assist</li> <li>• switches</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly machine builders</li> <li>• Material handling</li> <li>• Robotics</li> </ul>
		3	499 [2220]	.97 [25]		
		4	1025 [4559]	1.20 [30]		
		5	2167 [9639]	1.68 [43]		
PFC		L	11250 [50040]	3.93 [100.0]	<ul style="list-style-type: none"> <li>• ideal for heavy parts</li> <li>• rugged cam design with consistent clamping force</li> <li>• wide jaw throat</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Appliances</li> <li>• Sheet metal handling</li> </ul>
		W	7200 [32027]	3.93 [100.0]		

\* Gripping force shown on previous pages is at zero tooling length and 87 psi [6 bar] (pneumatic). The values shown are minimum produced. Optional spring assist can increase the gripping force shown or can be a safety device on the following types: Series 190/191, GRD, 5300, GRC, and GRT. The spring option can also be used to allow single acting operation of Series GRC, GRD, 5300, most 190/191, and GRT Grippers.

\*\* Above gripping force is at the corresponding minimum distance (from the jaw pivot) at 87 psi [6 bar] (pneumatic). Optional spring assist can increase the gripping force or be a safety device on the Series 5300.

## SEE THE PHD CLASSICS CATALOG FOR THE FOLLOWING PHD GRIPPERS:










**PARALLEL**  
Series 7900  
Series 8600

**ANGULAR**  
Series 7900 2 & 3 Jaw  
Series 8600 2 Jaw  
Series 190  
Series 8600 3 Jaw



# switches & sensors











SERIES	FOR USE WITH SERIES:	TYPE	MAJOR BENEFIT
<b>5360</b> page 9-6 	RA, RL, 160, LC, 5300, GRC	HALL	Solid State, providing long switch life and elimination of contact bounce. Operates on DC current only.
	RA, RL	REED	Available in AC or DC models. Special current-limit model available (AC). Ideal for input to sequencers and programmable controllers.
	RA, RL	SOLID STATE	Designed specifically to provide an input signal to controllers or logic systems. Solid State for an infinite number of trouble-free operations. DC only.
<b>6250</b> page 9-12 	CV, RA, RL, SK, SL, SG, SCV	REED	Offer 120 VAC or 10 to 30 VDC sink and source for maximum flexibility. Integral clamp mounting for easy adjustment, no need for brackets or hardware. IP67 environmental protection.
	CV, RA, RL, SK, SL, SG, SCV	SOLID STATE	Available in both current sink or source for maximum flexibility. "MR" switch prevents spikes, abuse, and adverse reactions.
<b>1750</b> page 9-16 	AV, HV, NP, 1-8000 Rotary Actuator, 1-8000 MMA, SD, SE, SG, SK/SL Size 1	REED	Available for most Tom Thumb and PHD products for simple interfacing. Compact low profile saves space and provides mounting versatility. 10-30 VDC or 110-120 VAC models.
	AV, HV, NP, 1-8000 Rotary Actuator, 1-8000 MMA, SD, SE, SG, SK/SL Size 1	SOLID STATE	Excellent switch hysteresis characteristics and symmetry. 10-30 VDC current sinking and sourcing. Compact low profile switch attaches securely across tie rods for easy adjustment.
<b>5580</b> page 9-19 	GRW, RF, GRF Size 19, GRD, 190, 191, GRL, LC Size 10	HALL	To be used on most Tom Thumb/PHD products. IEC IP67 rating. Solid State for long life. Suitable for use in plant environments conducive to difficulties for electromechanical and other types of controls. Reverse voltage protection built in.
	RF, GRD, 190, 191	REED	To be used on most Tom Thumb/PHD products. IEC IP67 rating. Adjustable mounting for versatility. LED provides convenient means for positioning and troubleshooting. DC service only.
<b>6790</b> page 9-21 	GRF, GRS, RCC, RI, SHP, STP, SIP, SMx, SxL, SxH, GRB, CRS, CTS, SFP, SFM	REED	4.5-30 VDC and 65-120 VAC models for simple interfacing to sequencers and programmable controllers.
	GRF, GRS, RCC, RI, SxL, SxH, SHP, STP, SIP, SMx, GRB, CRS, CTS, SFP, SFM	SOLID STATE	Space saving, mounting versatility, fits into grooves in the body of the actuator. Protects against voltage surges and other anomalies. Excellent switch hysteresis characteristics and symmetry. 4.5-30 VDC sink and source.
<b>DC Inductive Proximity</b> page 9-23 	SD, SE, SK, SL, SG, GRS, GRW, GRC, GRD, GRT, 190, 191, 8400	SOLID STATE	High reliability, ease of mounting, and suitable for plant environments that are conducive to creating difficulties for electromechanical and other types of switches.
<b>62002</b> page 9-24 	GRC	REED	High reliability, ease of mounting, and suitable for plant environments that are conducive to creating difficulties for electromechanical and other types of switches. 4.5 - 24 VDC.
<b>Sensor/Set Point Module</b> page 9-25 	1-8000 Rotary Actuator, 1-8000 MMA, 8400, 8600, 5300, 190, 191	SOLID STATE	Solid State electronics with Hall Effect sensing technology. Provides independent and fully adjustable multiple position sensing. Wide signal range capability.
<b>NFPA Brackets</b> page 9-30 	Mount Series 1750 Switches to NFPA cylinder	BRACKET	Brackets to mount Series 1750 Switches to large bore NFPA Cylinders. Flexible design attaches bracket securely to a single tie and does not allow switch to pull away from cylinder barrel.

SWITCHES

CAT-08

9-1



SERIES	SIZE	MAXIMUM TORQUE OUTPUT	MAJOR BENEFIT	APPLICATION	INDUSTRY USE
RCC (Cable)	 8 mm 12 mm 16 mm	1.8 to 13.7 in-lb at 100 psi [.20 to 1.55 Nm at 7 bar]	<ul style="list-style-type: none"> <li>• low cost</li> <li>• compact size</li> <li>• low profile</li> <li>• high thrust loads</li> </ul>	<ul style="list-style-type: none"> <li>• Part rotation</li> <li>• Electronic assembly</li> <li>• Labeling</li> <li>• Grip &amp; flip</li> </ul>	<ul style="list-style-type: none"> <li>• Electronics</li> <li>• Packaging</li> <li>• Assembly machine</li> </ul>
RF (Low Profile)	 14 mm - 25 mm	7 to 67 in-lb at 100 psi [0.8 to 7.7 Nm at 7 bar]	<ul style="list-style-type: none"> <li>• compact size</li> <li>• low profile</li> <li>• one piece hub &amp; piston assembly</li> <li>• fully adjustable stops</li> <li>• modularity with SHP &amp; GR T</li> </ul>	<ul style="list-style-type: none"> <li>• Part orientation</li> <li>• Sensing</li> <li>• Turntables</li> </ul>	<ul style="list-style-type: none"> <li>• Electronics</li> <li>• Packaging</li> <li>• Assembly machine</li> </ul>
RL	 12 mm - 63 mm	4.4 to 544 in-lb at 150 psi [.5 to 59.4 Nm at 10 bar]	<ul style="list-style-type: none"> <li>• low cost</li> <li>• OEM style rotaries</li> <li>• high radial axial bearing loads</li> <li>• high torque/package size</li> </ul>	<ul style="list-style-type: none"> <li>• Turntables</li> <li>• Machine load/unload</li> <li>• Label application</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Machine builders</li> <li>• General industrial use</li> <li>• Labeling/packaging</li> </ul>
RA	 20 mm - 50 mm	14 to 228 in-lb at 150 psi [1.6 to 24.9 Nm at 10 bar]	<ul style="list-style-type: none"> <li>• full featured rotary</li> <li>• high radial axial bearing loads</li> <li>• zero backlash at ends of rotation</li> <li>• wide variety of option&amp; accessories</li> </ul>	<ul style="list-style-type: none"> <li>• Turntables</li> <li>• Part orientation</li> <li>• Machine load/unload</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• Machine OEMs</li> <li>• General industrial use</li> </ul>
RI	 25 mm - 50 mm	37 to 476 in-lb at 100 psi [4.3 to 54.6 Nm at 7 bar]	<ul style="list-style-type: none"> <li>• high torque</li> <li>• high axial &amp; radial bearing load</li> <li>• thru hole shaft for built-in air communication ports</li> </ul>	<ul style="list-style-type: none"> <li>• Part orientation</li> <li>• Pick &amp; place</li> <li>• Machine load/unload</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General machine builders</li> <li>• Electronics</li> <li>• Stamping</li> </ul>
1000-8000	 1 in - 3 in	Pneumatic: 58 to 3,180 in-lb @ 150 psi [6.4 to 347 Nm @ 10 bar] Hydraulic: 585 to 31,800 in-lb @ 1500 psi [66 to 3579 Nm @ 103 bar]	<ul style="list-style-type: none"> <li>• heavy duty</li> <li>• wide variety of options &amp; accessories</li> <li>• versatile design</li> <li>• high torque</li> </ul>	<ul style="list-style-type: none"> <li>• Pneumatic or Hydraulic</li> <li>• General purpose rotary application</li> <li>• Machine load/unload</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General machine builders</li> </ul>
AIR/OIL TANDEM 2000-8000	 1 in - 3 in	58 to 1,590 in-lb @ 150 psi [6.4 to 174 Nm @ 10 bar]	<ul style="list-style-type: none"> <li>• smooth rotation throughout rotation</li> <li>• controlled velocity</li> </ul>	<ul style="list-style-type: none"> <li>• Machine load/unload</li> <li>• Turntable</li> <li>• Pick &amp; place</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General industrial machines</li> </ul>
MULTI-POSITION 2000-8000	 1 in - 3 in	Pneumatic: 58 to 1,590 in-lb @ 150 psi [6.4 to 174 Nm @ 10 bar] Hydraulic: 585 to 15,900 in-lb @ 1500 psi [66 to 1789 Nm @ 103 bar]	<ul style="list-style-type: none"> <li>• 3, 4, or 5 rotary positions</li> </ul>	<ul style="list-style-type: none"> <li>• Machine load/unload</li> <li>• Pick &amp; place</li> <li>• Part orientation</li> <li>• Reject/accept station</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive</li> <li>• General industrial machines</li> </ul>

**Unlimited™**  
UNIQUE SOLUTIONS



**Ball Valve Rotary**  
Model# ML302704  
Pneumatic ball valve actuator



**Replacement Rotary**  
Model# ML216496  
Direct mounting replacement



**RLS with Clutch**  
Model# ML302064  
Rotary with unidirectional clutch



**360° Rotary with Gripper**  
Model# ML307464  
360° Series RLS Rotary with Series 8400 Angular Gripper



SERIES	SIZE	MAX STROKE	MAX FORCE * lb [N]	MAJOR BENEFIT	INDUSTRY USE	
PA (Swing Arm)		2	1.043 [26.5]	46 [204]	<ul style="list-style-type: none"> <li>• Compact</li> <li>• 5 sizes</li> <li>• Multiple mounting surfaces</li> <li>• Left and right rotations</li> <li>• Steel and copper arms</li> <li>• Switch ready</li> </ul>	<ul style="list-style-type: none"> <li>• Welding</li> <li>• Machining</li> <li>• Assembly</li> <li>• General industrial automation</li> </ul>
		3	1.181 [30]	82 [365]		
		4	1.181 [30]	143 [636]		
		5	1.161 [29.5]	223 [992]		
		6	1.181 [30]	378 [1682]		
PB (Swing Arm)		S2	0.768 [19.5]	45 [200]	<ul style="list-style-type: none"> <li>• 4 sizes with 8 strokes</li> <li>• Left and right rotations</li> <li>• Rod weld cover available</li> <li>• Anti-backlash arm and guide available</li> <li>• Switch ready on 4 sides of clamp</li> </ul>	<ul style="list-style-type: none"> <li>• Welding</li> <li>• Machining</li> <li>• Assembly</li> <li>• General industrial automation</li> </ul>
		L2	1.161 [29.5]	45 [200]		
		S3	0.984 [25]	73 [325]		
		L3	1.378 [35]	73 [325]		
		S4	0.984 [25]	143 [636]		
		L4	1.378 [35]	143 [636]		
		S5	1.535 [39]	223 [992]		
		L5	2.717 [69]	223 [992]		
PNC NumberCruncher			MAX OPENING		<ul style="list-style-type: none"> <li>• High force</li> <li>• Standard characters</li> <li>• Operates within .5 sec</li> <li>• Quiet operation</li> </ul>	<ul style="list-style-type: none"> <li>• Numbering parts in steel, aluminum, copperbrass, plastic and leather</li> </ul>
		44	16	9005 [40056]		
		55	16	14790 [65790]		
		55-B01	16	25404 [113000]		
PHL (Die Lifter)			MAX STROKE		<ul style="list-style-type: none"> <li>• Available as drop-in replacement for General Motors Global Die Standards (GMGDS) 90.35.05-A and B</li> <li>• Built-in rod compliance eliminates side load on piston rod, thus increasing cylinder life</li> <li>• Composite bearings with internal lubrication for long life</li> </ul>	<ul style="list-style-type: none"> <li>• Material handling</li> <li>• Automotive</li> <li>• General industrial automation</li> </ul>
		6	1.969 [50]	420 [1870]		
			3.150 [80]			
			3.937 [100]			
			4.921 [125]			
			6.299 [160]			
	7.874 [200]					
PEC (Arm Over)			CLAMP TORQUE lb [N]	MAX HOLDING TORQUE lb [N]	<ul style="list-style-type: none"> <li>• Superior part holding</li> <li>• Widest range of high clamping force in its class</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly</li> <li>• Welding</li> </ul>
		33	225 [25]	1593 [180]		
		34	400 [45]	1593 [180]		
PLK (Pin Locating)			CLAMP FORCE lb [N]	CLAMP FORCE FACTOR CF IMPERIAL METRIC	<ul style="list-style-type: none"> <li>• Ideal for part clamping in weld areas</li> <li>• Completely enclosed finger/pin</li> <li>• Available in pin diameters from 12.5 to 24.5 mm diameter</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly</li> <li>• Welding</li> </ul>
		505	223 [991]	2.56 [165]		
		510	223 [991]	2.56 [165]		

\*Maximum force is calculated at 87 psi [6 bar].