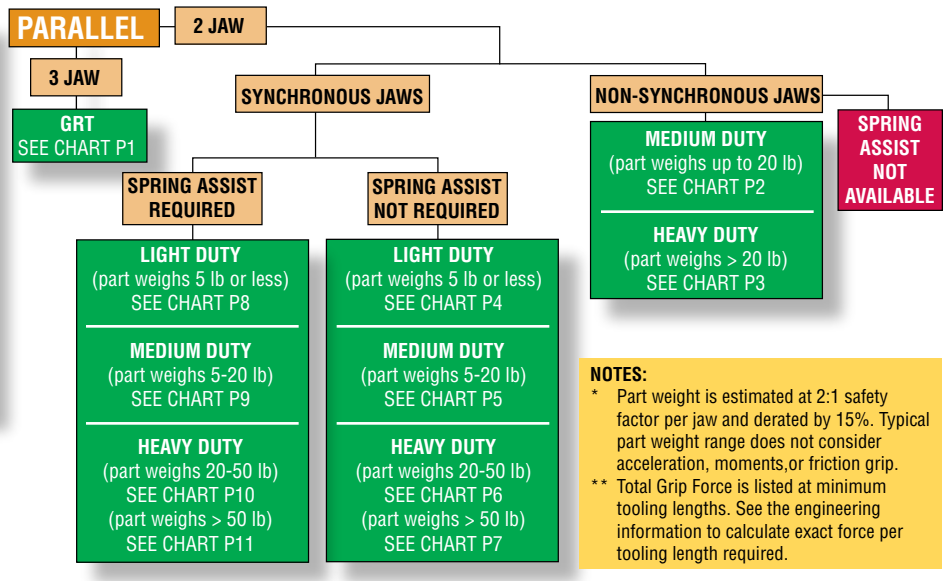
PARALLEL GRIPPER SELECTION/COMPARISON GUIDE

The intent of this guide is to provide a quick visual comparison of grippers that are categorized by application criteria.

It is recommended that you use PHD's online sizing software or the sizing catalog for exact gripper sizing. Consult PHD Application Engineering for assistance.



NOTES:

* Part weight is estimated at 2:1 safety factor per jaw and derated by 15%. Typical part weight range does not consider acceleration, moments,or friction grip.

** Total Grip Force is listed at minimum tooling lengths. See the engineering information to calculate exact force per tooling length required.

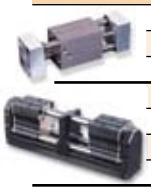
P1: Parallel/3 Jaws

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (5 [2.3], 10 [4.5], 15 [7], 20 [9], 50 [23], 75 [34], 100 [45], 150 [68], 200 [91], 250 [113])	TOTAL DIAMETRAL JAW TRAVEL in	TOTAL DIAMETRAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Internal Proximity Switch Ready	Spring Assist: Heavy Force Closed	Spring Assist: Heavy Force Open	Part Ejector	Seals: Buna-N (Standard)	Seals: Fluoro-Elastomer
GRTx11	5 [2.3]	0.236	6	1.5	40	44	196	●	●	●	●	●	●
GRTx12	13 [5.8]	0.315	8	1.97	50	112	499	●	●	●	●	●	●
GRTx13	19 [8.6]	0.472	12	2.56	65	168	747	●	●	●	●	●	●
GRTx14	25 [11.2]	0.630	16	2.95	75	218	971	●	●	●	●	●	●
GRTx15	43 [19.4]	0.787	20	3.94	100	378	1683	●	●	●	●	●	●
GRTx16	64 [29.3]	1.024	26	4.92	125	569	2531	●	●	●	●	●	●
GRTx17	100 [45.2]	1.260	32	5.91	150	880	3912	●	●	●	●	●	●
GRTx18	164 [74.6]	1.575	40	7.87	200	1452	6459	●	●	●	●	●	●

P2: Parallel/2 Jaws/Non-Synchronous Jaws/Medium Duty

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (2 [0.9], 4 [1.8], 6 [2.7], 8 [3.6], 10 [4.6], 12 [5.4], 15 [7], 20 [9], 25 [11], 30 [14])	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Proximity Switches	Hall Switch Ready	Manifold
GRL 14x7	4.8 [2.2]	0.28	7	3	75	28	124	●	●	●
GRL 14x13	5.1 [2.3]	0.51	13	3	75	30	132	●	●	●
GRL 16x20	7 [3.2]	0.79	20	4	100	41	182	●	●	●
GRL 16x25	7 [3.2]	1.02	26	5	125	41	182	●	●	●
GRW03-x-16	6.1 [2.8]	0.79	20	4.5	114	36	160	●	●	●
GRW03-x-25	15.3 [6.9]	2.09	53	8	200	90	400	●	●	●

P3: Parallel/2 Jaws/Non-Synchronous Jaws/Heavy Duty



GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (10 [4.5], 20 [9], 30 [14], 40 [18], 50 [23], 75 [34], 100 [45], 125 [57], 150 [68], 200 [91])	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Sensors/Switches	Manifold	Rodlok	Jaw Travel Limitation	NPT Ports	Corrosion Resistant	Fluoro-Elastomer Seals
GRW03-x-32	29 [13.1]	2.56	65	14	350	170	756	●	●			●	●	
GRW03-x-40	35 [16.0]	3.58	91	15	381	207	921	●	●			●	●	
GRW03-x-50	73 [33.1]	4.61	117	18.5	470	429	1908	●	●			●	●	
GRR22-x-63x150	120 [54.3]	5.91	150	20	500	704	3130	●		●	●	●	●	●
GRR22-x-63x200	120 [54.3]	7.87	200	20	500	704	3130	●		●	●	●	●	●
GRR22-x-63x250	120 [54.3]	9.84	250	20	500	704	3130	●		●	●	●	●	●
GRR22-x-63x350	120 [54.3]	13.80	350	20	500	704	3130	●		●	●	●	●	●

PARALLEL GRIPPER SELECTION/COMPARISON GUIDE

P4: Parallel/2 Jaws/Synchronous Jaws/Springs Not Required/Light Duty (up to 5 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (0.25 [.1], 0.5 [.2], 1 [.4], 1.5 [.7], 2 [.9], 3 [1.4], 4 [1.8], 5 [2.3], 6 [2.7], 7 [3.2])	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Hall Sensor	Proximity Switch Ready	Spring Assist: Close	Spring Assist: Open	Seals: Buna-N (Standard)	Seals: Fluoro-Elastomer
19x6x (Short Travel)	0.9 [0.4]	.157	4	2.5	63	5.3	24	●	●	●		●	●
19x7x (Short Travel)	1.8 [0.8]	.276	7	3.8	96	10.6	47	●	●	●	●	●	●
19x8x (Short Travel)	3.7 [1.7]	.394	10	4	102	21.8	97	●	●	●	●	●	●
19x6x (Long Travel)	0.5 [0.2]	.315	8	2.5	63	3.2	14	●	●	●		●	●
19x7x (Long Travel)	1.4 [0.6]	.433	11	3.8	96	8.1	36	●	●	●	●	●	●
19x8x (Long Travel)	2.2 [1.0]	.630	16	4	102	13.1	58	●	●	●	●	●	●
19x9x (Long Travel)	4 [1.8]	.866	22	4	102	23.5	105	●	●	●	●	●	●
GRL12-x-14x7	4.8 [2.2]	.280	7	3	76.2	28	124		●			●	

P5: Parallel/2 Jaws/Synchronous Jaws/Springs Not Required/Medium Duty (5-20 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (2.5 [1.1], 5 [2.3], 7.5 [3.4], 10 [4.5], 12.5 [5.7], 15 [7], 17.5 [8], 20 [9], 25 [11], 30 [14])	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Proximity Switch Ready	Spring Assist: Close	Spring Assist: Open	Shurgrip Part Retention	Corrosion Resistant	Manifold Ports	Fluoro-Elastomer Seals
GRS33-x-27x4.5	11.6 [5.2]	.177	4.5	2.2	35.9	68	302	●	●	●			●	
GRS33-x-27x7	8.2 [3.7]	.276	7	2.2	55.9	48	213	●	●	●			●	
GRS33-x-28x6	13.1 [5.9]	.250	6.35	3.2	81.3	77	341	●	●	●			●	
GRS33-x-28x10	8.2 [3.7]	.394	10	3.2	81.3	48	213	●	●	●			●	
GRS33-x-32x8	18.5 [8.4]	.315	8	3.2	81.3	109	485	●	●	●			●	
GRS33-x-32x13	11.9 [5.4]	.512	13	3.2	81.3	70	310	●	●	●			●	
GRDx31	5.6 [2.5]	.147	3.75	3	76.2	33	147	●	●	●				●
GRDx41	6.8 [3.1]	.294	7.5	3	76.2	40	178	●	●	●				●
GRDx51	14.8 [6.7]	.275	7.0	4	102	87	387	●	●	●				●
GRDx52	9.2 [4.2]	.462	11.7	4	102	54	240	●	●	●				●
GRDx62	15.5 [7.0]	.659	16.75	5	127	91	406	●	●	●				●
GRW13-x-16x20	6.1 [2.8]	.790	20	5	127	36	168	●				●	●	
GRW13-x-25x53	15.3 [6.7]	2.09	53	8	203.2	90	400	●				●	●	
GRL12-x-14x13	5.1 [2.7]	.51	13	3	76.2	30	130	●					●	
GRL12-x-16x20	7 [3.2]	.79	20	4	102	41	182	●					●	
GRL12-x-16x26	7 [3.2]	1.02	26	5	127	41	182	●					●	
GRF31-x-19x4.5	5.1 [2.3]	.177	4.5	1.4	35.6	30	135	●						
GRF34-x-25x6.5	6 [2.7]	.256	6.5	2	50.8	35	156	●						
GRF33-x-28x6	13.1 [5.9]	.25	6	2.8	71.1	77	341	●						
GRF33-x-28x10	8.2 [3.7]	.394	10	2.8	71.1	48	13	●						
GRF33-x-32x8	19.7 [8.9]	.315	8	4	100	116	516	●						
GRF33-x-32x13	14.5 [6.6]	.512	13	2.8	71.1	85	378	●						
GRCx31 & GRCx33	14.1 [6.4]	.940	24	5	127	83	369	●	●	●	●			●
GRCx32 & GRCx34	16.3 [7.4]	.940	24	5	127	96	427	●	●	●	●	●		●
19x9x (Short Travel)	7.2 [3.3]	.512	13	4	102	42.6	190	●	●	●				●

P6: Parallel/2 Jaws/Synchronous Jaws/Springs Not Required/Heavy Duty (20-50 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (10 [4.5], 15 [6.8], 20 [9], 25 [11.3], 30 [13.6], 35 [16], 40 [18], 50 [23], 60 [27], 70 [32])	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Proximity Switch Ready	Spring Assist: Close	Spring Assist: Open	Corrosion Resistant	Manifold Ports	Shurgrip Part Retention	Fluoro-Elastomer Seals
GRS33-x-50x19	40 [18.1]	.750	19	4.2	106	235	1045	●	●	●		●		
GRS33-x-50x28	26.7 [12.1]	1.102	28	4.2	106	157	697	●	●	●		●		
GRDx61	23.1 [10.5]	.383	9.75	5	127	136	604	●	●	●				●
GRW13-x-32x65	28.9 [13.1]	2.56	65	14	350	170	756	●			●	●		
GRW13-x-40x91	35.2 [16]	3.58	91	15	381	207	921	●			●	●		
GRCx41 & GRCx43	35.5 [16.1]	1.475	37.5	5	127	209	930	●	●	●	●		●	●
GRCx42 & GRCx44	30.3 [13.7]	1.475	37.5	5	127	178	792	●	●	●	●		●	●
1536x	21.8 [9.9]	.62	15.8	6	152	128	570	●	●	●				●
1537x	44.4 [20.1]	1.00	254	8	203	261	1164	●	●	●				●

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PARALLEL GRIPPER SELECTION/COMPARISON GUIDE

P7: Parallel/2 Jaws/Synchronous Jaws/Springs Not Required/Heavy Duty (over 50 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg]	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Proximity Switches	Spring Assist: Close	Spring Assist: Open	Corrosion Resistant	Fluoro-Elastomer Seals	Rodlok	Shurgrip Part Retention	Manifold Ports	NPT Ports
GRS33-x-63x32	67.7 [30.7]	1.260	32	6.5	152	398	1770	●	●	●					●	●
GRS33-x-63x44	49.1 [22.3]	1.732	44	6.5	152	289	1287	●	●	●					●	●
GRW13-x-50x117	72.9 [33.1]	4.61	117	18	450	429	1908	●			●				●	●
GRCx5x	65.1 [29.5]	1.945	49.5	6	152	383	1704	●	●	●		●				●
GRCx5x (Shurgrip)	54.1 [24.5]	1.945	49.5	6	152	318	1414	●	●	●	●	●		●		●
GRCx6x	147.9 [67.1]	3.010	76.5	10	254	870	3870	●	●	●		●				●
GRCx6x (Shurgrip)	103.5 [47.0]	3.010	76.5	10	254	609	2709	●	●	●	●	●		●		●
1538x	82.9 [37.6]	1.31	33.3	10	254	488	2172	●	●	●		●				●
1539x	166.6 [75.6]	1.80	45.8	10	254	980	4356	●	●	●		●				●
GRR12-x-63x150	120 [54.3]	5.91	150	20	500	704	3131	●			●	●	●			●
GRR12-x-63x200	120 [54.3]	7.87	200	20	500	704	3131	●			●	●	●			●
GRR12-x-63x250	120 [54.3]	9.84	250	20	500	704	3131	●			●	●	●			●
GRR12-x-63x300	120 [54.3]	13.8	350	20	500	704	3131	●			●	●	●			●

P8: Parallel/2 Jaws/Synchronous Jaws/Spring Assist (Close)/Light Duty (up to 5 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg]	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Hall Sensor	Proximity Switch Ready	Spring Assist: Close	Spring Assist: Open	Seals: Buna-N (Standard)	Seals: Fluoro-Elastomer
19x7x (Short Travel)	2.2 [1.0]	.276	7	3.8	96	12.8	57	●	●	●	●	●	●
19x8x (Short Travel)	4.4 [2.0]	.394	10	4	102	26	116	●	●	●	●	●	●
19x7x (Long Travel)	1.7 [0.8]	.433	11	3.8	96	9.8	44	●	●	●	●	●	●
19x8x (Long Travel)	2.7 [1.2]	.630	16	4	102	15.7	70	●	●	●	●	●	●
19x9x (Long Travel)	4.8 [2.2]	.866	22	4	102	28	124	●	●	●	●	●	●

P9: Parallel/2 Jaws/Synchronous Jaws/Spring Assist (Close)/Medium Duty (5-20 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg]	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] N	OPTIONS: Proximity Switches	Spring Assist: Close	Spring Assist: Open	Manifold Ports	Fluoro-Elastomer Seals
GRS33-x-27x4.5	15.3 [6.9]	.177	4.5	2.2	35.9	90	400	●	●	●	●	
GRS33-x-27x7	10.7 [4.9]	.276	7	2.2	35.9	63	280	●	●	●	●	
GRS33-x-28x6	17 [7.7]	.250	6.35	2.2	35.9	100	445	●	●	●	●	
GRS33-x-28x10	10.5 [4.8]	.394	10	3.2	81.3	62	276	●	●	●	●	
GRS33-x-32x13	15.1 [6.9]	.512	132	3.2	81.3	89	396	●	●	●	●	
GRDx31	8.2 [3.7]	.147	3.75	3	76.2	48	213	●	●	●		●
GRDx41	10.2 [4.6]	.294	7.5	3	76.2	60	267	●	●	●		●
GRDx52	13.6 [6.2]	.462	11.7	4	102	80	356	●	●	●		●
19x9x (Short Travel)	8.7 [4.0]	.512	13	4	102	51	227	●	●	●		●

NOTES:

* Part weight is estimated at 2:1 safety factor per jaw and derated by 15%. Typical part weight range does not consider acceleration, moments,or friction grip.

** Total Grip Force is listed at minimum tooling lengths. See the engineering information to calculate exact force per tooling length required.

PARALLEL GRIPPER SELECTION/COMPARISON GUIDE

P10: Parallel/2 Jaws/Synchronous Jaws/Spring Assist (Close)/Heavy Duty (20-50 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (10 [5], 15 [7], 20 [9], 25 [11], 30 [14], 35 [16], 40 [18], 50 [23], 60 [27], 70 [32])	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi lb	**TOTAL CLOSE GRIP FORCE AT [6 bar] N	OPTIONS: Proximity Switches	Spring Assist: Close	Spring Assist: Open	Manifold Ports	Corrosion Resistant	Shurgrip Part Retention	Fluoro-Elastomer Seals
GRS33-x-32x8	23.5 [10.6]	.315	8	3.2	81	138	614	●	●	●	●			
GRS33-x-50x28	35 [15.9]	1.102	28	4.2	106	206	916	●	●	●	●			
GRDx51	21.9 [9.9]	.275	7	4	102	129	574	●	●	●				●
GRDx61	34.3 [15.6]	.383	9.75	5	127	202	898	●	●	●				●
GRDx62	23 [10.4]	.659	16.75	5	127	135	600	●	●	●				●
GRCx3x	25 [11.3]	.940	24	5	127	147	654	●	●	●				●
GRCx3x (Shurgrip)	21.6 [9.8]	.940	24	5	127	127	565	●	●	●		●	●	●
GRCx4x (Shurgrip)	46 [20.9]	1.475	37.5	5	127	271	1205	●	●	●		●	●	●
1536x	28.3 [12.8]	.620	15.8	6	152	166	741	●	●	●				●

P11: Parallel/2 Jaws/Synchronous Jaws/Spring Assist (Close)/Heavy Duty (over 50 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (45 [20], 50 [23], 60 [27], 75 [34], 100 [45], 150 [68], 200 [91], 250 [113], 300 [136], 350 [159])	TOTAL JAW TRAVEL in	TOTAL JAW TRAVEL mm	TOOLING LENGTH MAXIMUM in	TOOLING LENGTH MAXIMUM mm	**TOTAL CLOSE GRIP FORCE AT 87 psi lb	**TOTAL CLOSE GRIP FORCE AT [6 bar] N	OPTIONS: Proximity Switches	Spring Assist: Close	Spring Assist: Open	Manifold Ports	Corrosion Resistant	Shurgrip Part Retention	Fluoro-Elastomer Seals
GRS33-x-50x19	52.5 [23.8]	.750	19	4.2	106	309	1374	●	●	●	●			
GRS33-x-63x32	81 [36.8]	1.260	32	6.5	152	477	2122	●	●	●	●			
GRS33-x-63x44	59 [26.8]	1.732	44	6.5	152	347	1543	●	●	●	●			
GRCx4x	54 [24.6]	1.475	37.5	5	127	319	1419	●	●	●				●
GRCx5x	100 [45.3]	1.945	49.5	6	152	587	2611	●	●	●				●
GRCx6x	227 [102.9]	3.010	76.5	10	254	1335	5938	●	●	●				●
GRCx5x (Shurgrip)	83 [37.6]	1.945	49.5	6	152	488	2171	●	●	●		●	●	●
GRCx6x (Shurgrip)	158 [71.6]	3.010	76.5	10	254	929	432	●	●	●		●	●	●
1537x	59 [27]	1.00	25.4	8	203	346	1539	●	●	●				●
1538x	108 [79]	1.31	33.3	10	254	633	2816	●	●	●				●
1539x	225 [102]	1.80	45.8	10	254	1323	5885	●	●	●				●

ANGULAR GRIPPER SELECTION/COMPARISON GUIDE

The intent of this guide is to provide a quick visual comparison of grippers that are categorized by application criteria.

It is recommended that you use PHD's online sizing software or the sizing catalog for exact gripper sizing. Consult PHD Application Engineering for assistance.

ANGULAR — **2 JAW**

- **180° JAW OPENING NOT REQUIRED**
  - **LIGHT DUTY** (part weighs 5 lb or less) SEE CHART A2
  - **MEDIUM DUTY** (part weighs 5-20 lb) SEE CHART A3
  - **HEAVY DUTY** (part weighs 20-50 lb) SEE CHART A4
- **180° JAW OPENING REQUIRED**
  - **GRB** SEE CHART A1

NOTES:

* Part weight is estimated at 2:1 safety factor per jaw at the typical gripping distance listed. Typical part weight range does not consider acceleration, moments, or friction grip. Optional spring assist can increase the gripping force or provide single acting service.

** Total Grip Force is listed minimum tooling length, see the engineering information to calculate exact force per tooling length required.

ANGULAR GRIPPER SELECTION/COMPARISON GUIDE

A1: Angular/2 Jaws/180° Jaw Opening Required

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (2 [0.9] 5 [2.3] 10 [4.5] 15 [7] 20 [9] 30 [14] 45 [20] 60 [27] 75 [34] 90 [41])	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	N	TYPICAL GRIPPING DISTANCE in	mm	DISPLACEMENT in³	cm³	OPTIONS: Magnet for Switches	Proximity Switch Ready	Port Location
GRB11-x-12	1.4 [.64]	13	57	.83	21.0	0.09	1.4	●	●	●
GRB11-x-16	2.9 [1.32]	28	124	1.08	27.5	0.21	3.5	●	●	●
GRB11-x-20	9.6 [4.4]	79	353	1.10	38.0	0.38	6.2	●	●	●
GRB11-x-32	21.5 [9.76]	179	797	1.53	39.0	1.33	22	●	●	●
GRB11-x-40	33.6 [15.2]	265	1180	1.91	48.5	2.84	47	●	●	●
GRB11-x-50	70.7 [32.1]	549	2443	2.95	75.0	7.00	115	●	●	●

A2: Angular/2 Jaws/Light Duty (up to 5 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (.5 [0.2] 1 [0.4] 1.5 [7] 2 [0.9] 2.5 [1.1] 3 [1.4] 3.5 [1.6] 4 [1.8] 4.5 [2] 5 [2.3])	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	N	TYPICAL GRIPPING DISTANCE in	mm	DISPLACEMENT in³	OPTIONS: Hall Sensor	Sensor Ready	Proximity Switch Ready	Fluoro-Elastomer Seals
8400	1.4 [.64]	11.7	52	.33	8.4	.007	●	●		●
8410	2.6 [1.19]	19.7	88	.45	11.4	.018	●	●	●	●

A3: Angular/2 Jaws/Medium Duty (5-20 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (2 [0.9] 3 [1.7] 4 [1.8] 5 [2.3] 6 [2.7] 7 [3.2] 8 [3.6] 10 [4.5] 12.5 [5.7] 15 [6.8])	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	N	TYPICAL GRIPPING DISTANCE in	mm	DISPLACEMENT in³	OPTIONS: Hall Sensor	Sensor Ready	Proximity Switch Ready	Fluoro-Elastomer Seals
8420	6.7 [3.0]	55	244	.66	16.8	.055	●	●	●	●
8430	11.5 [5.2]	81	359	.87	22.1	.150	●	●	●	●

A4: Angular/2 Jaws/Heavy Duty (over 20 lb part weight)

GRIPPER MODEL #	*TYPICAL PART WEIGHT RANGE lb [kg] (20 [9] 40 [18] 80 [36] 100 [45] 150 [68] 200 [91] 500 [227] 1000 [454] 2000 [907])	**TOTAL CLOSE GRIP FORCE AT 87 psi [6 bar] lb	N	TYPICAL GRIPPING DISTANCE in	mm	DISPLACEMENT in³	cm³	OPTIONS: Hall Sensor	Sensor Ready	Proximity Switch Ready	Spring Assist: Close	Spring Assist: Open	Fluoro-Elastomer Seals
1532x	23.8 [10.8]	201	894	1.37	34.8	.59	9.6	●	●	●	●	●	●
1533x	50.7 [23]	499	2220	1.91	48.5	1.78	29.3	●	●	●	●	●	●
1534x	95.7 [43.4]	1025	4559	2.57	65.3	4.29	70.3	●	●	●	●	●	●
1535x	222.7 [101]	2167	9639	3.27	83.1	12.66	207.3	●	●	●	●	●	●

NOTES:

* Part weight is estimated at 2:1 safety factor per jaw at the typical gripping distance listed. Typical part weight range does not consider acceleration, moments,or friction grip. Optional spring assist can increase the gripping force or provide single acting service.

** Total Grip Force is listed minimum tooling length, see the engineering information to calculate exact force per tooling length required.

GRIPPER SIZING GUIDELINES

Proper gripper sizing and selection is dependent on a number of parameters. The table below lists the primary parameters along with the reason they are important. This guide provides the basic steps to selecting the right gripper for your application.

PARAMETER	IMPORTANCE
• Planned operating pressure at the gripper • Weight and geometry or shape of part • Weight and geometry of tooling • Tooling length Parallel gripper: Distance from the center of the gripping point to the face of the gripper Angular gripper: Distance from the center of the gripping point to the jaw pivot point • Type of grip on part (external or internal, encapsulated or friction) • Total gripper jaw travel or jaw rotation required • Desired gripper cycle time • Accelerations and decelerations due to part manipulation • Is spring assist desired/required	Affects whether the part can be gripped and manipulated
• Metric or imperial customer interface • Sensing requirements • Environment	Affects unit type and option selection

Once the above parameters are known, the next step is to determine the appropriate style and size of the gripper. Following are two methods that can be used to select the style and size of the gripper.

Method 1: Using PHD's Sizing Software

1. Refer to the Gripper Selection Guide on pages 4-1 through 4-9 to determine which grippers meet the style and jaw travel requirements for your application.
2. Input the application parameters (pressure, part weight and tooling length, etc.) into the software.
3. With your application's jaw travel requirements in mind, select a gripper from the list of valid devices shown in the software.
4. Using the information in the Engineering Data section of the catalog, confirm the selected gripper can withstand the applied jaw moments and axial force for your application. When calculating applied moments, include the grip force, part weight, acceleration, and external forces.
5. With the jaw travel, grip force and moment capacity confirmed, double check that the gripper's operating pressure range is acceptable, the gripper meets the cycle time requirements and if needed, the desired switch package and accessories are specified.

Method 2: Using Hand Calculations

1. Refer to the Gripper Selection Guide on pages 4-1 through 4-9 to determine which grippers meet the style and jaw travel requirements for your application.
2. Use Equation 1 below to **approximate** the required grip force factor (G_F).
3. Keeping in mind the style and jaw travel requirements of your application, select a gripper using the table on the following page with a grip force factor (G_F) equal to or greater than the minimum G_F value calculated.
4. Refer to the Engineering Data section of the catalog for the selected gripper and calculate the Total Grip Force (including tooling length effects). Remember to include spring assist grip force if desired. Verify that the Total Grip Force is adequate to maintain your desired Safety Factor of grip force to part weight.
5. Using the information in the Engineering Data section of the catalog, confirm the selected gripper can withstand the applied jaw moments and axial force for your application. When calculating applied moments, include the grip force, part weight, acceleration, and external forces.
6. With the jaw travel, grip force and moment capacity confirmed, double check that the gripper meets the cycle time requirements and that, if needed, the desired switch package and accessories are specified.

EQUATION 1:

	Parallel Grippers	Angular Grippers
Imperial	$G_F = (M \times F_S)/P$	$G_F = (M \times K \times F_S)/P$
Metric	$G_F = (9.81 \times M \times F_S)/P$	$G_F = (9.81 \times M \times K \times F_S)/P$

P = Working pressure, psi [bar]

M = Part mass, lb [kg]

K = Distance from jaw pivot to gripping point, in [mm]
(Note: Since the actual value of K is gripper dependent, enter a best estimate)

F_S = Safety Factor
PHD recommends that jaw tooling encapsulate the part. With part encapsulation, a minimum 2:1 safety factor of Total Grip Force to part weight should be used. For unencapsulated part applications, a minimum 4:1 safety factor is typical.