

# PHL

## HEAVY LIFTERS FOR MATERIAL HANDLING



- *Ideal for automated, high load part lifting in the automotive and assembly machine builder industries*
- *Available as a drop-in replacement*



M002 Mounting



M001 Mounting



Switches



Stop Collars


**ISO-9001  
CERTIFIED**

Quality Management  
System Certified

PHL02A



PHD is a member of the  
MAC Distributor Network

**phd**   
SOLUTIONS FOR INDUSTRIAL AUTOMATION

[www.phdinc.com](http://www.phdinc.com)

# ORDERING DATA: SERIES PHL HEAVY LIFTER

## INDEX:

**Ordering Data**  
Page 2

**Benefits**  
Page 3

**Dimensions**  
Pages 4 to 6

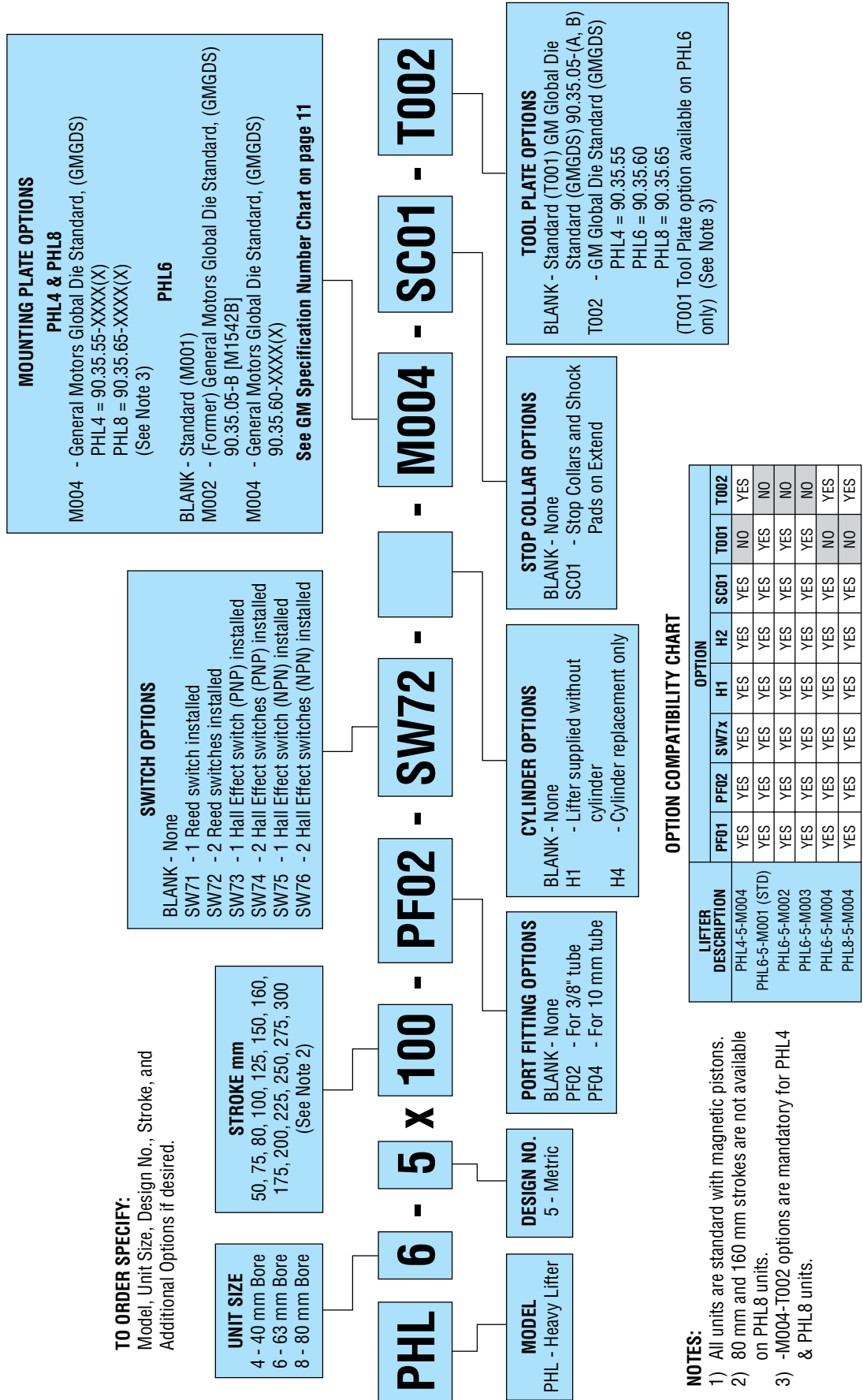
**Engineering Data**  
Page 7

**Options**  
Pages 8 & 9

**Exploded View**  
Pages 10

**Parts List, Repair Kits,  
& GM Specification  
Numbers**  
Page 11

**Application Example**  
Page 12

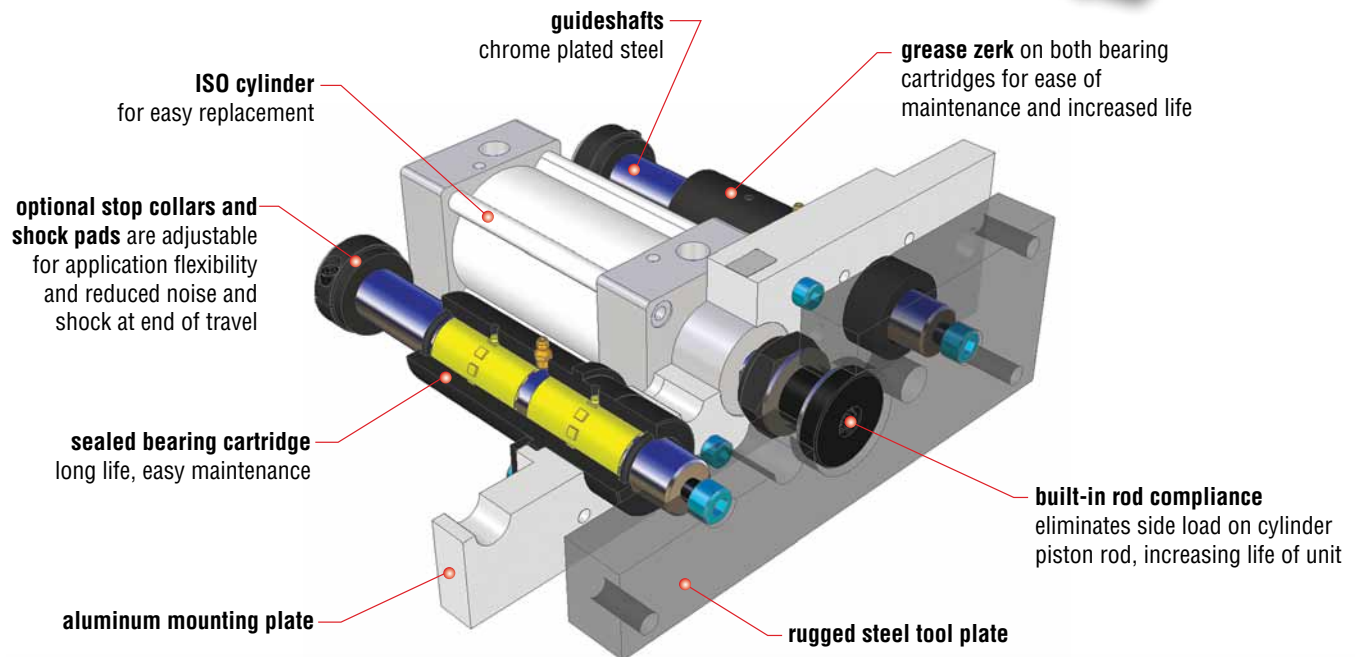




## IDEAL FOR AUTOMATED, HIGH LOAD PART LIFTING APPLICATIONS



proximity switches are available for sensing end of travel



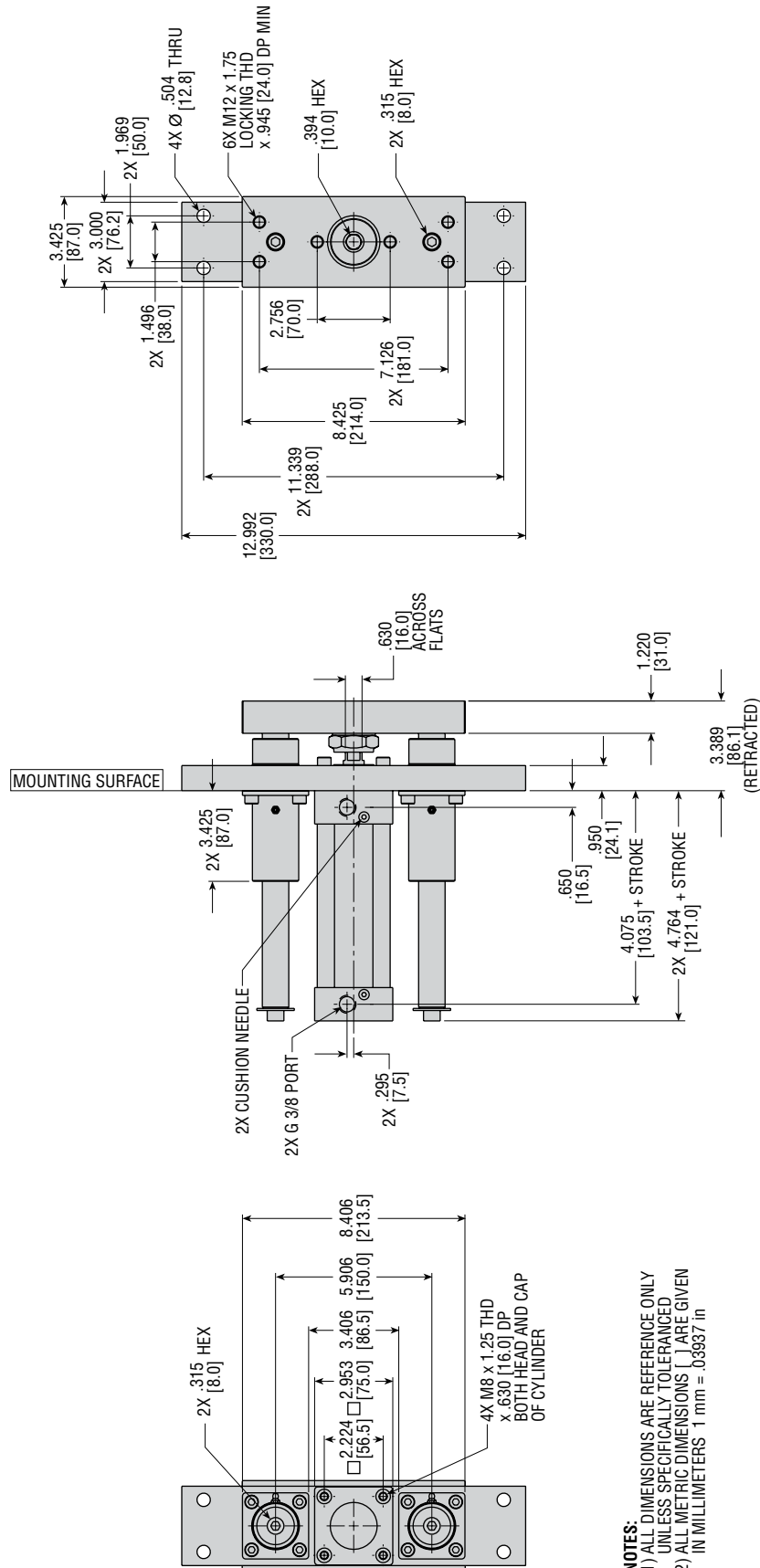
### Major Benefits

- Simple design, compact size, long life, and the ability to handle high off-center loads
- Available as drop-in replacement for General Motors Global Die Standards, (GMGDS) 90.35.05-B, 90.35.55-xxxx(x), 90.35.60-xxxx(x), and 90.35.65-xxxx(x)
- Available in three bore sizes with many stroke lengths to fit your application requirements
- Built-in rod compliance eliminates side load on cylinder piston rod thus increasing life
- Fully field repairable in just 10 minutes, using metric hex wrenches
- Composite bearings with internal lubrication for long life
- Replaceable bearings eliminate costly lifter replacement

### Industry Uses

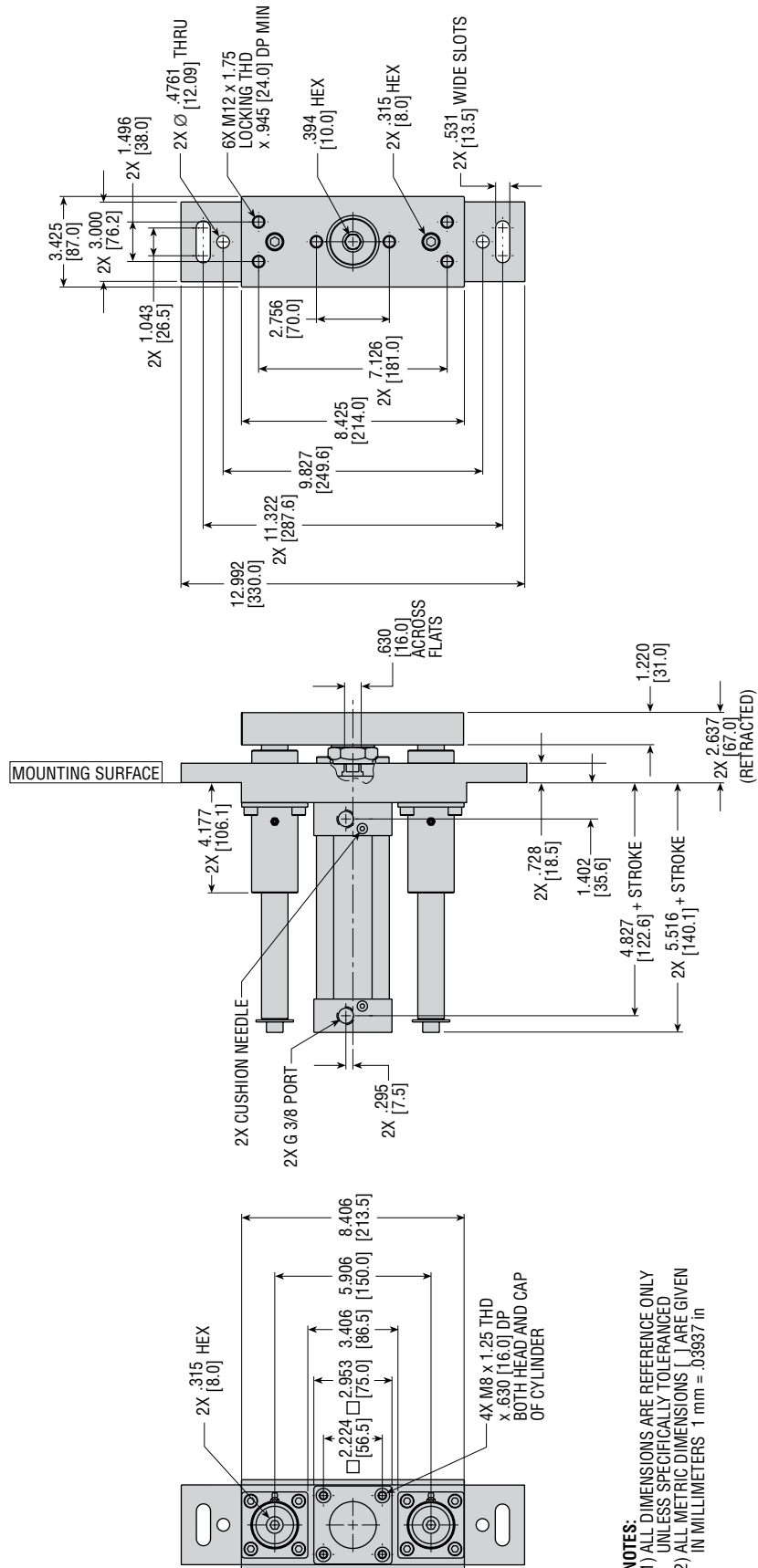
- Material handling
- Automotive
- Assembly machine builders

# DIMENSIONS: SERIES PHL6 - M001-T001 MOUNTING STYLE



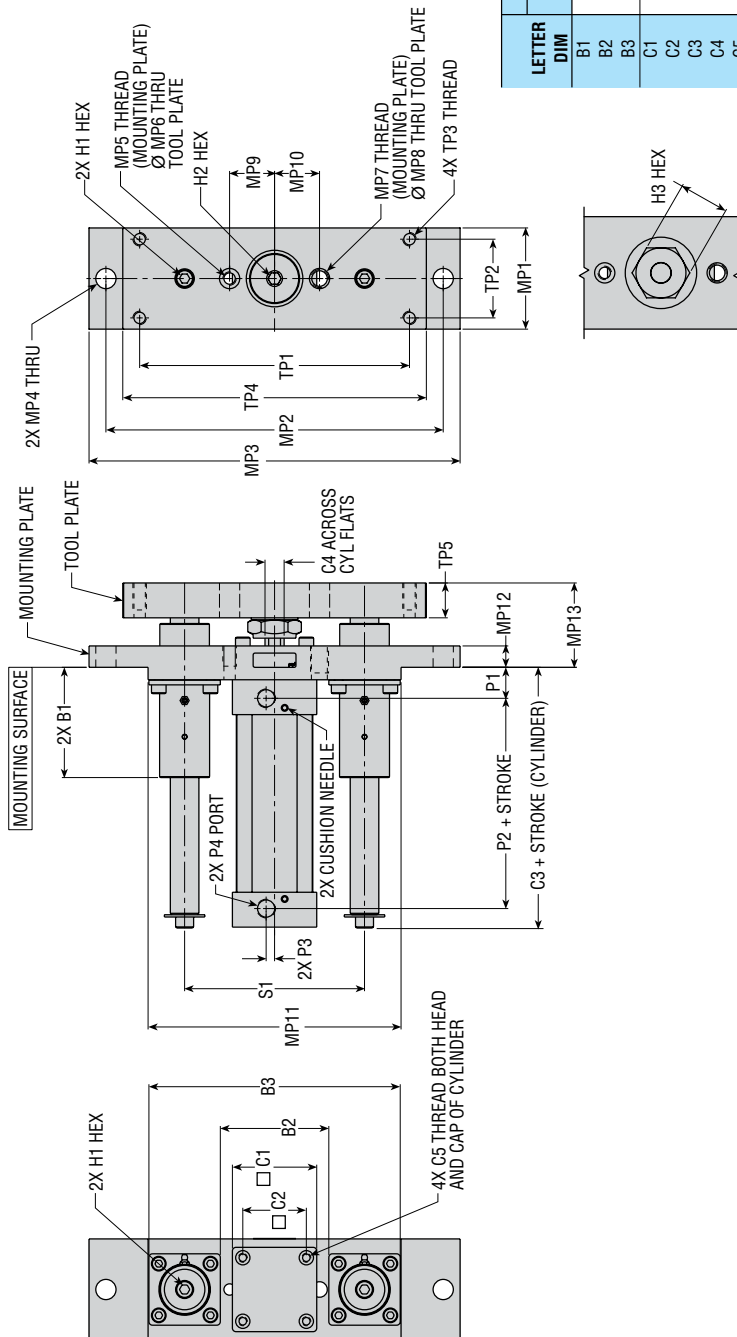
**NOTES:**  
 1) ALL DIMENSIONS ARE REFERENCE ONLY UNLESS SPECIFICALLY TOLERANCED  
 2) ALL METRIC DIMENSIONS [ ] ARE GIVEN IN MILLIMETERS 1 mm = .03937 in

# DIMENSIONS: SERIES PHL6 - M002-T001 MOUNTING STYLE



**NOTES:**  
 1) ALL DIMENSIONS ARE REFERENCE ONLY UNLESS SPECIFICALLY TOLERANCED  
 2) ALL METRIC DIMENSIONS [ ] ARE GIVEN IN MILLIMETERS 1 mm = .03937 in

# DIMENSIONS: SERIES PHL - M004-T002 MOUNTING STYLE



**PHL8**

LETTER DIM	PHL4		MODEL NUMBER		PHL8	
	in	mm	in	mm	in	mm
B1	3.861	98.1	3.861	98.1	3.896	99.0
B2	3.012	76.5	3.799	96.5	4.587	116.5
B3	8.012	203.5	8.799	223.5	9.587	243.5
C1	2.087	53.0	2.953	75.0	3.740	95.0
C2	1.496	38.0	2.224	56.5	2.835	72.0
C3	4.570	116.1	5.160	131.1	5.511	140.0
C4	.512	13.0	.669	17.0	.866	22.0
C5	M6 x 1		M8 x 1.25		M10 x 1.5	
H1	x .630 [16.0] DP		x .630 [16.0] DP		x .787 [20.0] DP	
H2	8 mm		8 mm		8 mm	
H3	10 mm		10 mm		—	—
H3	1.250	31.8	1.625	41.3	1.750	44.5
MP1	2.953	75.0	3.543	90.0	3.937	100.0
MP2	11.024	280.0	11.811	300.0	12.598	320.0
MP3	12.205	310.0	12.992	330.0	13.780	350.0
MP4	.709	18.0	.709	18.0	.709	18.0
MP5	M12 THREAD	x .709 [18.0] DP MIN	M12 THREAD	x .709 [18.0] DP MIN	M12 THREAD	x .709 [18.0] DP MIN
MP6	.709	18.0	.709	18.0	.709	18.0
MP7	M16 THREAD	x .945 [24.0] DP MIN	M16 THREAD	x .945 [24.0] DP MIN	M16 THREAD	x .945 [24.0] DP MIN
MP8	.709	18.0	.709	18.0	.709	18.0
MP9	1.260	32.0	1.575	40.0	1.969	50.0
MP10	1.260	32.0	1.575	40.0	1.969	50.0
MP11	8.070	205.0	8.858	225.0	9.842	250.0
MP12	.748	19.0	.748	19.0	.827	21.0
MP13	2.953	75.0	2.953	75.0	3.268	83.0
P1	1.066	27.1	1.086	27.6	1.122	28.5
P2	2.874	73.0	3.425	87.0	3.740	95.0
P3	.236	6.0	.295	7.5	.433	11.0
P4	G 1/4		G 3/8		G 3/8	
S1	5.512	140.0	6.299	160.0	7.087	180.0
TP1	8.661	220.0	9.449	240.0	10.236	260.0
TP2	1.772	45.0	2.756	70.0	2.756	70.0
TP3						
TP4	9.843	250.0	10.630	270.0	11.417	290.0
TP5	1.220	31.0	1.220	31.0	1.220	31.0

**NOTES:**  
 1) ALL DIMENSIONS ARE REFERENCE ONLY UNLESS SPECIFICALLY TOLERANCED.  
 2) ALL METRIC DIMENSIONS [ ] ARE GIVEN IN MILLIMETERS 1 mm = .03937 in

# ENGINEERING DATA: SERIES PHL HEAVY LIFTER

SPECIFICATIONS	SERIES PHL
OPERATING PRESSURE	20 psi min to 130 psi [1.4 bar min to 9.0 bar max]
OPERATING TEMPERATURE	23° to + 158°F [-5° to + 70°C]
LUBRICATION*	Factory lubricated for life

\*Periodic lubrication of bearing cartridges, piston rod, and thrust washers decreases wear and extends life.

MODEL	STROKE (mm)		TYPICAL CYCLE TIME (sec) EXTEND / RETRACT			UNIT WEIGHT lb [kg]				
						MOUNTING/TOOL PLATE STYLE				
	LENGTH	TOLERANCE	PHL4	PHL6	PHL8	PHL4 M004-T002	M001-T001	PHL6 M002-T001	M004-T002	PHL8 M004-T002
PHL	50	+3.8/-0	0.09	0.14	0.21	23.40 [10.6]	25.5 [11.6]	26.0 [11.8]	29.3 [13.3]	35.20 [16.0]
	75		0.11	0.18	0.27	24.00 [10.9]	26.3 [11.9]	26.8 [12.2]	30.0 [13.6]	36.20 [16.4]
	80*		0.11	0.19	—	24.10 [10.9]	26.3 [11.9]	26.8 [12.2]	30.1 [13.7]	—
	100		0.13	0.23	0.34	24.60 [11.2]	27.0 [12.2]	27.5 [12.5]	30.7 [13.9]	37.20 [16.9]
	125		0.15	0.27	0.41	25.20 [11.4]	27.7 [12.6]	28.2 [12.8]	31.5 [14.3]	38.30 [17.4]
	150		0.17	0.31	0.48	25.80 [11.7]	28.3 [12.8]	28.8 [13.1]	32.2 [14.6]	39.30 [17.8]
	160*		0.18	0.33	—	26.00 [11.8]	28.7 [13.0]	29.2 [13.2]	32.5 [14.7]	—
	175		0.19	0.36	0.55	26.40 [12.0]	29.0 [13.1]	29.5 [13.4]	32.9 [14.9]	40.30 [18.3]
	200		0.21	0.40	0.61	27.10 [12.3]	29.6 [13.4]	30.1 [13.7]	33.7 [15.3]	41.40 [18.8]
	225		0.23	0.44	0.68	27.70 [12.6]	30.3 [13.7]	30.8 [13.9]	34.4 [15.6]	42.40 [19.2]
	250		0.25	0.49	0.75	28.30 [12.8]	30.9 [14.0]	31.4 [14.2]	35.1 [15.9]	43.40 [19.7]
	275		0.27	0.53	0.82	28.90 [13.1]	31.6 [14.3]	32.1 [14.5]	35.9 [16.3]	44.50 [20.2]
300	0.29	0.58	0.89	29.50 [13.4]	32.2 [14.6]	32.7 [14.8]	36.6 [16.6]	45.50 [20.6]		

NOTES: 1) \*These stroke lengths are not available as a standard for PHL8 units.  
2) Cycle times are based on 3/8" air lines, valve of cv 5.1, and visually acceptable cushions.

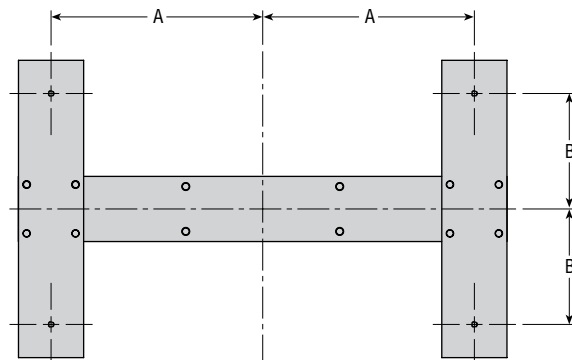
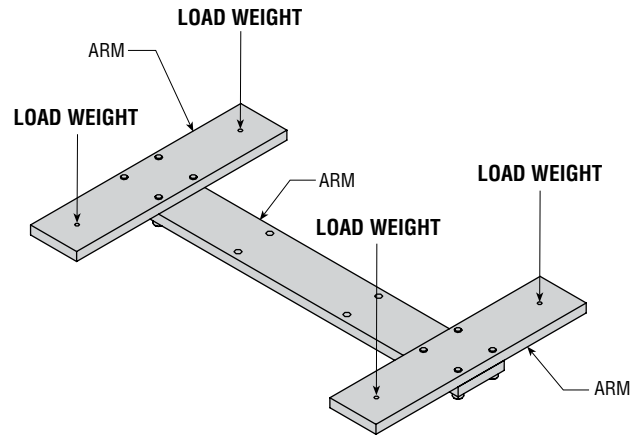
MODEL	BORE		EFFECTIVE PISTON AREA	
			in <sup>2</sup> [mm <sup>2</sup> ]	
	in	mm	EXTEND	RETRACT
PHL4	1.575	40	1.95 [1257]	1.64 [1056]
PHL6	2.480	63	4.83 [3117]	4.34 [2803]
PHL8	3.150	80	7.79 [5027]	7.03 [4536]

MODEL	RECOMMENDED MAX LOAD	
	lb	kg
PHL4	88.2	40.0
PHL6	132.3	60.0
PHL8	176.4	80.0

Use of flow controls recommended at higher loads to reduce shock and vibration

MODEL	OVERHANG DISTANCE				TESTED LOAD WEIGHT AT A-B*	
	A		B			
	in	mm	in	mm	lb	kg
PHL4	12.21	310.0	5.91	150.0	9.8	4.4
PHL6	12.99	330.0	7.09	180.0	18.8	8.5
PHL8	13.78	350.0	7.87	200.0	29.0	13.2

\*Tested with load weight at each corner for a balanced load



# OPTIONS: SERIES PHL HEAVY LIFTER

## PF02 PORT FITTING - SWIVEL ELBOWS FOR 3/8" TUBE

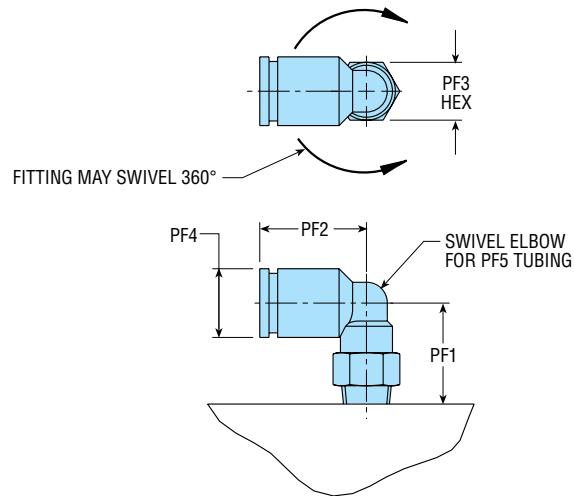
## PF04 PORT FITTING - SWIVEL ELBOWS FOR 10 mm TUBE

Both fittings insert into the G 3/8 ports in the cylinder. Both fittings swivel 360 degrees.

LETTER	PF02				PF04			
	PHL4		PHL6 & PHL8		PHL4		PHL6 & PHL8	
DIM	in	mm	in	mm	in	mm	in	mm
PF1	.768	19.5	.768	19.5	.748	18.5	.748	19.0
PF2	1.024	26.0	1.024	26.0	1.024	26.0	1.024	26.0
PF3	.551	14.0	.748	19.0	.551	14.0	.748	19.0
PF4	.650	16.5	.650	16.5	.650	16.5	.650	16.5
PF5	3/8	—	3/8	—	—	10	—	10

TO ORDER FITTING SEPARATELY:

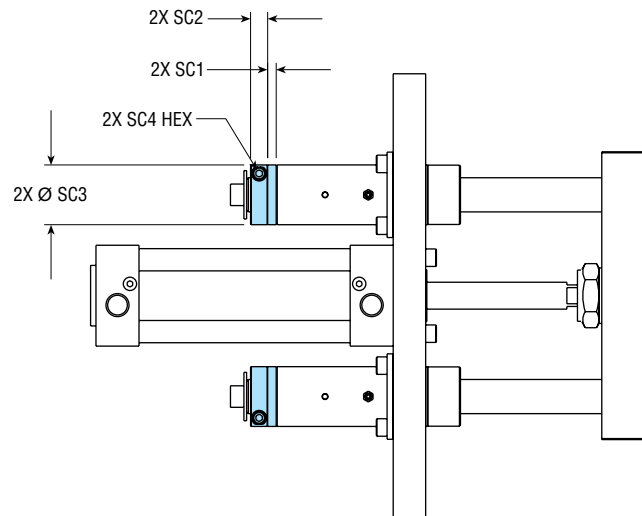
OPTION	FITTING PART NUMBER	
	PHL4	PHL6 & PHL8
PF02	62178-010	62178-014
PF04	62195-010	62195-011



## SC01 STOP COLLARS AND SHOCK PADS ON EXTENSION

Two travel adjustment stop collars with polyurethane shock pads are used for adjustment of lifter extension. The travel adjustment stop collars allow precise adjustment while the shock pads eliminate metal-to-metal contact, thereby reducing noise.

LETTER	PHL4		PHL6		PHL8	
	in	mm	in	mm	in	mm
SC1	.250	6.4	.250	6.4	.250	6.4
SC2	.500	12.7	.500	12.7	.749	19.0
SC3	1.750	44.5	1.750	44.5	2.345	59.6
SC4	3/16		3/16		6 mm	



## SW71 ONE REED SWITCH INSTALLED

## SW72 TWO REED SWITCHES INSTALLED

See next page for specifications.

## SW73 ONE HALL EFFECT SWITCH (PNP) INSTALLED

## SW74 TWO HALL EFFECT SWITCHES (PNP) INSTALLED

## SW75 ONE HALL EFFECT SWITCH (NPN) INSTALLED

## SW76 TWO HALL EFFECT SWITCHES (NPN) INSTALLED

See next page for specifications.



# OPTIONS: SERIES PHL HEAVY LIFTER

## REED SWITCHES

KIT NO.	DESCRIPTION
73198-01	NPN (Sink) or PNP (Source), 5-240V AC/DC, Quick Disconnect

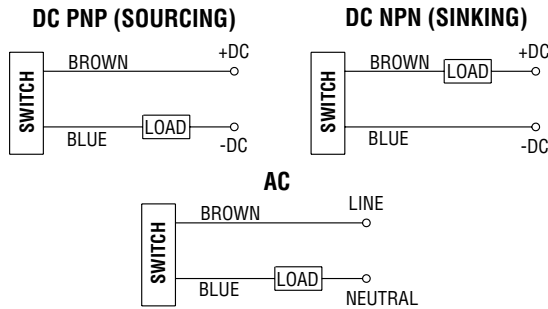
SPECIFICATIONS	73166-01
ACTUATED BY	Moving Magnet
POWER CAPACITY	10 W Max.
OUTPUT STATE	Normally Open
OPERATING PRINCIPLE	Magnetic Reed
OUTPUT TYPE	SPST Contact Closure
OPERATING VOLTAGE	5 - 240V AC/DC
CURRENT RATING (RES.)	100mA Max.
BURDEN CURRENT	—
VOLTAGE DROP	2.5 V Max.
CIRCUIT PROTECTION	None
LED COLOR	Green
OPERATING TEMPERATURE	-10° to 70°C
ENVIRONMENTAL	IP67
CABLE TYPE	PVC

## HALL EFFECT SWITCHES

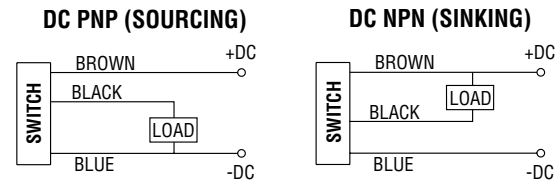
KIT NO.	DESCRIPTION
73198-02	Solid State PNP (Source) 5 - 30 DC, Quick Disconnect
73198-03	Solid State NPN (Sink) 5 - 30 DC, Quick Disconnect

SPECIFICATIONS	73168-02	73168-03
ACTUATED BY	Moving Magnet	
POWER CAPACITY	6 W Max.	
OUTPUT STATE	Normally Open	
OPERATING PRINCIPLE	Magnetic Hall Effect	
OUTPUT TYPE	Solid State PNP	Solid State NPN
OPERATING VOLTAGE	5 - 30V DC	
CURRENT RATING (RES.)	200mA Max.	
BURDEN CURRENT	13mA Max.	20mA Max.
	@24 VDC	@24 VDC
VOLTAGE DROP	.5 V Max.	
CIRCUIT PROTECTION	Power Source Reverse, Surge Suppression	
LED COLOR	Red	Green
OPERATING TEMPERATURE	-10° to 70°C	
ENVIRONMENTAL	IP67	
CABLE TYPE	PVC	

## WIRING SCHEMATICS



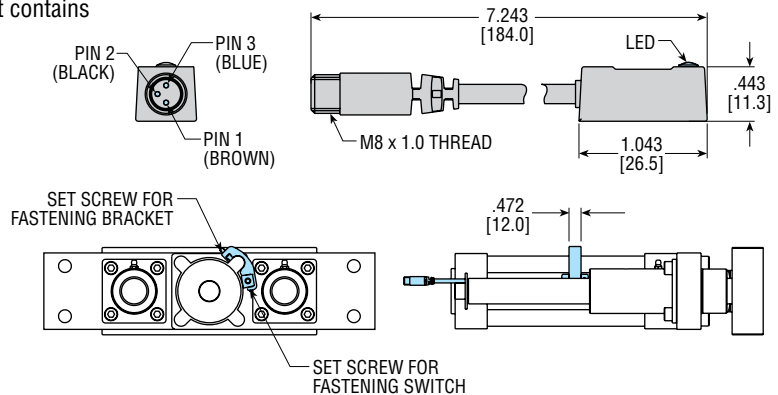
## WIRING SCHEMATICS



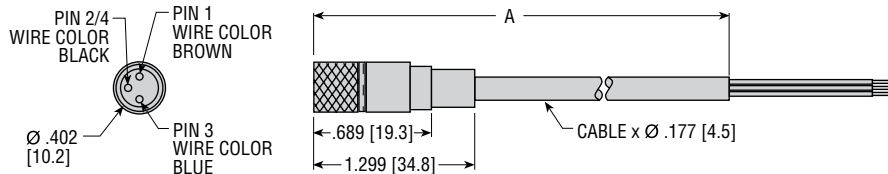
Switches and switch brackets are installed on the cylinder as shown below. Replacement switches and switch brackets can be ordered. A switch bracket kit contains one switch bracket. A switch kit contains one switch.

DESCRIPTION	KIT NO.
REED SWITCH	73198-01
HALL EFFECT SWITCH (PNP)	73198-02
HALL EFFECT SWITCH (NPN)	73198-03
SWITCH BRACKET PHL4	73167
PHL6	73167-01
PHL8	73167-02

- NOTES:**
- 1) ALL DIMENSIONS ARE REFERENCE ONLY UNLESS SPECIFICALLY TOLERANCED
  - 2) ONLY ONE SWITCH AND BRACKET ASSEMBLY SHOWN ON LIFTER FOR CLARITY PURPOSES.



## 63549-xx CORDSET WITH FEMALE QUICK CONNECT

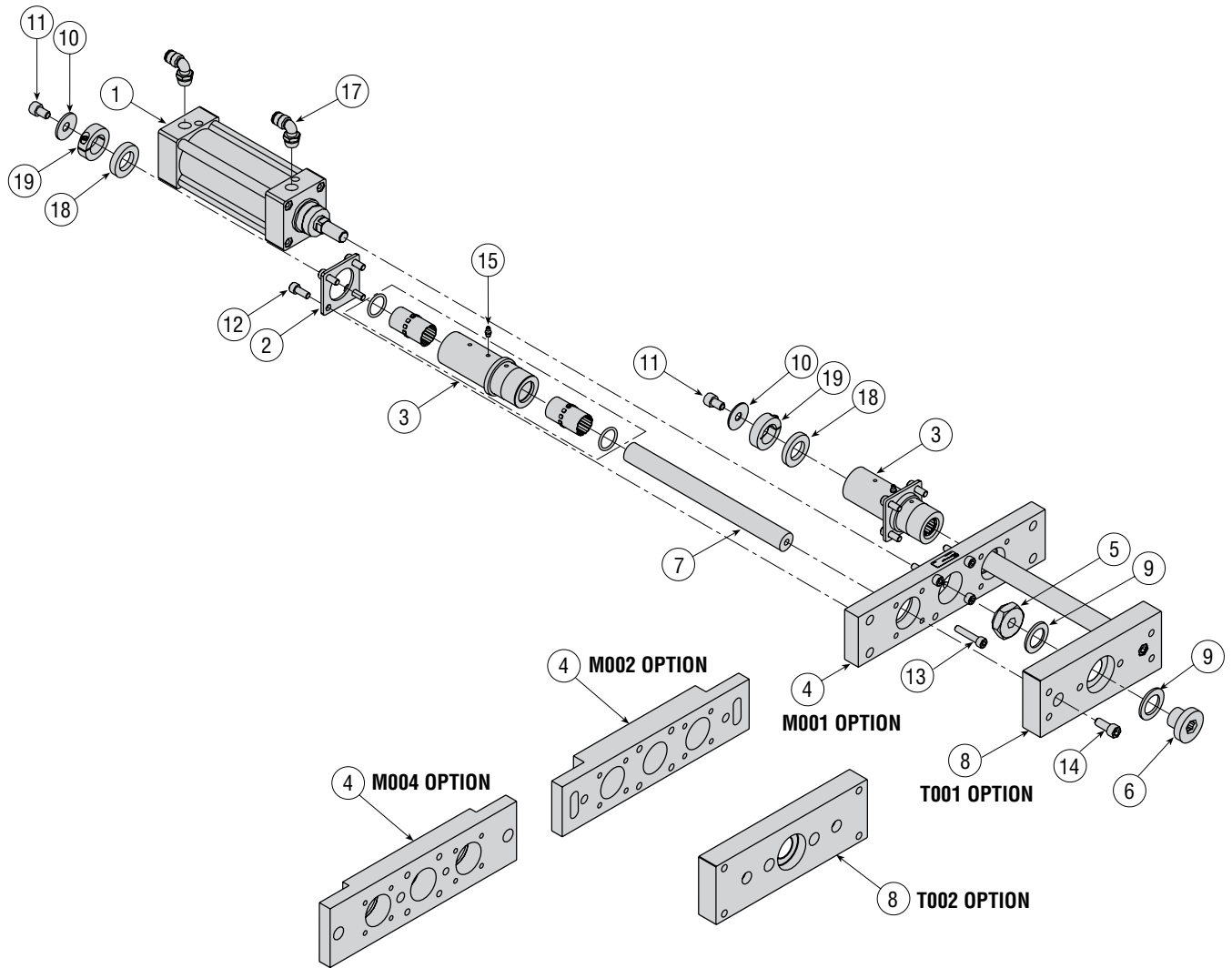


MODEL NO.	LETTER DIM.
	A
63549-02	78.74 [2 m]
63549-05	196.85 [5 m]

- NOTE:**
- 1) ALL NUMBERS IN [ ] ARE METRIC AND ARE IN mm

All dimensions are reference only unless specifically toleranced.

# EXPLODED VIEW: SERIES PHL HEAVY LIFTER



# PARTS LISTS: SERIES PHL HEAVY LIFTER

OPTION	KEY	DESCRIPTION	PART NUMBER				
			M001-T001	M002-T001	M004-T002	PHL4	PHL6
Standard Unit	1	ISO Cylinder	73165-XCPC6-5-xxx	73165-XCPC6-5-xxx	73165-XCPC4-5-xxx	73165-XCPC6-5-xxx	73165-XCPC8-5-xxx
	2	Bearing Flange	73805-001	73805-001	73805-001	73805-001	73805-001
	3	Bearing Cartridge Assembly	73802-001-01	73802-001-01	73802-001-01	73802-001-01	73802-001-03
	4	Mounting Plate	73807-001	73807-002	73807-009	73807-010	73807-011
	5	Rod Coupling	73808-001	73808-001	73808-005	73808-001	73808-007
	6	Tool Plate Coupling	73808-002	73808-002	73808-006	73808-002	73808-008
	7	Guide Shaft	73809-11-xxxx	73809-11-xxxx	73809-11-xxxx	73809-11-xxxx	73815-11-xxxx
	8	Tool Plate	73810-001	73810-001	73810-007	73810-006	73810-008
	9	Thrust Washer	73811-001	73811-001	73811-002	73811-001	73811-003
	10	Flat Washer	70365-007	70365-007	70365-007	70365-007	70365-007
	11	Guide Shaft SHCS (M10 x 16)	59104-162	59104-162	59104-162	59104-162	59104-162
	12	Bearing Flange SHCS (M8 x 20)	59104-139	59104-139	59104-139	59104-139	59104-139
	13	Cylinder Mounting SHCS	59104-031	59104-032	59104-122	59104-142	59104-170
	14	Tool Plate SHCS (M10 x 25)	59104-166	59104-166	59104-166	59104-166	59104-166
	15	Grease Zerk	63086	63086	63086	63086	63086
PF02	17	Plastic Tube Port Fitting	62178-014	62178-014	62178-010	62178-014	62178-014
PF04			62195-011	62195-011	62195-010	62195-011	62195-011
SC01	18	Shock Pad	52990	52990	52990	52990	79652
SC01	19	Stop Collar	11272-011-0	11272-011-0	11272-011-0	11272-011-0	79627-1-4

-xxx and -xxxx = Stroke (mm) - Available Strokes: 50 mm (-050 or -0050)  
75 mm (-075 or -0075)  
80 mm (-080 or -0080) (Not available as standard on PHL8 units)  
100 mm (-100 or -0100)  
125 mm (-125 or -0125)  
150 mm (-150 or -0150)  
160 mm (-160 or -0160) (Not available as standard on PHL8 units)  
175 mm (-175 or -0175)  
200 mm (-200 or -0200)  
225 mm (-225 or -0225)  
250 mm (-250 or -0250)  
275 mm (-275 or -0275)  
300 mm (-300 or -0300)

#### ORDERING EXAMPLE:

Replacement Cylinder Only = PHL6-5x100-H4  
Replacement Lifter Without Cylinder = PHL6-5x100-H1

## KITS

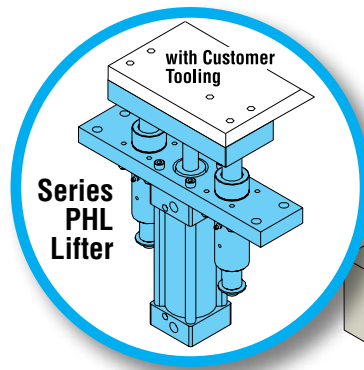
KIT DESCRIPTION	KIT NUMBER		
	PHL4	PHL6	PHL8
Fastener Kit M001-T001	—	73812-001	—
M002-T001	—	73812-002	—
M004-T002	73812-013	73812-014	73812-015
Stop Collar and Shock Pad Kit	73812-003	73812-003	73812-016
Thrust Washer Kit	73812-011	73812-005	73812-017
Composite Bearing Kit	73812-006	73812-006	73812-018

## GM SPECIFICATION NUMBER

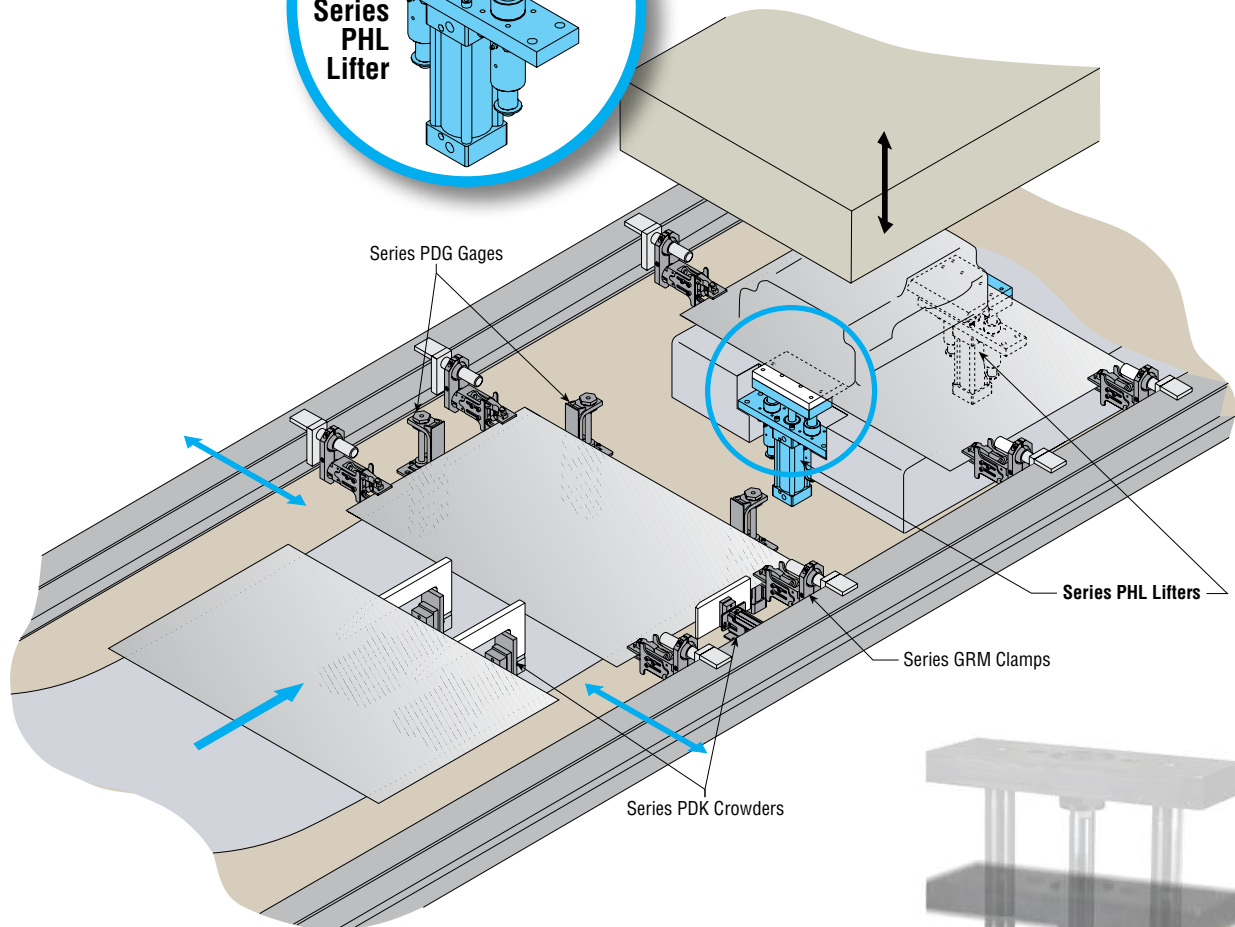
PHD LIFTER DESCRIPTION	GMGDS CODE		
	PHL4-5-xxx	PHL6-5-xxx	PHL8-5-xxx
PHLx-x-050-M004-T002	90.35.55-4050	90.35.60-6350	90.35.65-8050
PHLx-x-075-M004-T002	90.35.55-4075	90.35.60-6375	90.35.65-8075
PHLx-x-100-M004-T002	90.35.55-40100	90.35.60-63100	90.35.65-80100
PHLx-x-125-M004-T002	90.35.55-40125	90.35.60-63125	90.35.65-80125
PHLx-x-150-M004-T002	90.35.55-40150	90.35.60-63150	90.35.65-80150
PHLx-x-175-M004-T002	90.35.55-40175	90.35.60-63175	90.35.65-80175
PHLx-x-200-M004-T002	90.35.55-40200	90.35.60-63200	90.35.65-80200
PHLx-x-225-M004-T002	90.35.55-40225	90.35.60-63225	90.35.65-80225
PHLx-x-250-M004-T002	90.35.55-40250	90.35.60-63250	90.35.65-80250
PHLx-x-275-M004-T002	90.35.55-40275	90.35.60-63275	90.35.65-80275
PHLx-x-300-M004-T002	90.35.55-40300	90.35.60-63300	90.35.65-80300

-xxx = STROKE IN mm

# APPLICATION EXAMPLE: SERIES PHL HEAVY LIFTER



During the stamping process, the part configuration may demand the use of lifters. The Series PHL Heavy Lifter provides an ideal solution for lifting heavy or large panels out of dies. The PHL Lifters have the capability to accept customer tooling that can reach into the die to support heavy or large panels.



**PHD, Inc.**  
9009 Clubridge Drive  
P.O. Box 9070, Fort Wayne, Indiana 46899 U.S.A.  
Phone (260) 747-6151 • Fax (260) 747-6754  
www.phdinc.com • phdinfo@phdinc.com

**PHDinEurope GmbH**  
Zum Carl-Alexander-Park 6  
52499 Baesweiler, Germany  
Tel. +49 (0)2401-619 77 0 • Fax. +49 (0)2401-619 77 99  
www.phdinc.com • info@PHDinEurope.de