Unique Solutions for Unique Industry Requirements
Over 50 Years of Dedication

In 2007, PHD celebrated its 50th anniversary. Since 1957, our customers have trusted PHD to produce high quality, reliable products for their automation needs.

We have a full line of components: cylinders, escapements, grippers, slides, rotary actuators, clamps, multi-motion actuators, and proximity switches and sensors to provide the motion you require. With millions of component variations, we can help move, turn, slide, lift, grip, reach, rotate, and clamp almost anything to increase your productivity.

Our components are completely modular. Using either bolt direct units or transition plates, our actuators can be combined to create millions of application variations.

If an application requires a modified component, our Unique Solutions® team is ready to help. We welcome special requests for unique products, regardless of quantity or frequency of order.

The products, supported by our strong commitment to delivery, service, and quality have made us a leader in the modular automation industry.
Nowhere in our industry is product delivery taken as seriously as it is at PHD. Even with the wide range of options offered on PHD products, shipping time in most cases is one to four working days. In today’s fast-paced competitive markets, we understand the need for quick turnaround. With a track record of 98% on-time shipments, you can be assured of prompt delivery.

PHD’s engineering software provides powerful design and selection tools at your fingertips. The software eliminates risk and simplifies your design process and component selection, while offering significant time savings.

Nearly every standard unit PHD makes is manufactured to order. That’s because PHD has such a wide variety of actuators, options and accessories available. PHD has the capabilities built into our factory systems to modify products within our everyday processes. Because of our flexibility, creating Unique Solutions® is simple for PHD.

We have dedicated assembly cells, machining centers, and many engineers to design and build unique solutions for our customers. With over 34,000 unique designs and over 100,000 quotes already in our database, we can provide most quotes within eight working hours. We have the systems in place to provide the best delivery in the industry.

**Unique Solutions® Classifications**

Our Unique Solutions® designs are divided into classifications used to determine the additional requirements needed to produce your specific actuator. Below are 5 classifications that are used throughout this brochure. Each classification level going from 1 to 5 represent a higher level of modifications.

For example, Class 1 designs require only minor modifications to our standard products, while Class 5 is a unit unlike any of our standard products and is a completely new design.

- **Class 1** – Modification to assembly procedure
- **Class 2** – Change of BOM using standard components
- **Class 3** – Modification of standard catalog actuator
- **Class 4** – Modification of standard catalog actuator requiring parts made from scratch
- **Class 5** – Unit made completely from scratch

Creating Unique Solutions is simple for PHD. We can make solutions simple for you!
We understand your unique automation requirements.

1-800-624-8511
Contact the PPC Group for PPC Division assistance.
With millions of component variations, we can help pick, place, twist, turn, lift, grip, reach, rotate, eject, and clamp what you need to increase your productivity. If an application requires a modified component, our Plastic Packaging Components team is ready to help. We welcome special requests for unique products, regardless of quantity or frequency of order.

Series 1 Pneumatic Nozzle Cylinder (SB02-SB06)
CLASS 5
Mounts into the same space and bolt patterns
Longer life, less downtime
Simplified design and maintenance
Provides energy savings with enhanced sealing technology

Series 1 Heat Set Nozzle Cylinder
CLASS 5
Cylinder built like Series 2 Cold Set

Filler Cam Engagement Slide
CLASS 5
Stainless steel shafts and tool plate make this unit corrosion resistant
Counterbored tool plate mounting holes recess bolt ends, reducing overall unit length

Preferential Preform/Bottle Eject Slide
CLASS 5
Direct replacement for Series 2
Direct valve manifold provides quicker response with higher kinetic energy capacity

Thermoforming Cylinder
CLASS 5
Direct replacement
Withstands high temps
Fully field-repairable
Significantly longer life and reduces downtime

Replacement Cam Follower Wheels
CLASS 4
Significantly longer life than competitor wheels
Can be made in a variety of materials and sizes
ML308345 Cobble Full Repeat Stroke Machine
CLASS 5
Single acting
Manifold of four cylinder bores to replace single cylinders on machine
Hardcoated aluminum body, bronze rod bushings, and 303 stainless steel piston rods
Manifold mounting for MAC Series 34 valve for lowest response time and highest machine performance
Lubricated air not needed
Sintered filter plug and tighter rod tolerances for superior lint protection
Long life, tested to over 100 million cycles
Easily field repairable
PHD LitStore CP308345

ML305112 Carpet Gripper
CLASS 4
Modular gripper/cylinder combination

Carpet Tufters-Level Cut Loop
CLASS 4
Single acting
Direct drop-in replacement of OEM parts
Hardcoated aluminum body, zinc plated steel cap, and 303 stainless steel piston rod
Built-in push to connect fitting for Ø 1/8 in tubing for ease of installation
Lubricated air not needed
Sintered filter plug and tighter rod tolerances for superior lint protection
Cylinder is hex-keyed through rear port for easy installation using basic hand tools
Long life design
Easily field repairable
Lowest cost of ownership
PHD LitStore CP307489, CP307835, CP308893, and CP309305
A Slippage Solution

Our C4467 Carpet Stretcher is outfitted with “tenter pin” jaw tooling and is used to transfer automotive carpeting into position for molding. This unit also used to stretch the carpet prior to molding. The tooling is made up of numerous sharp points that pierce the carpet, thus eliminating any slippage. See above.

**ML305315 Modular Device**
- CLASS 5
- .250 x 1.50 in (x8)
- MAC Valve ready
- Flange mounted
- Compact design
- Hardcoated aluminum body
- Lubricated air not needed

**ML308855**
- Dual pinion rotary actuator. Pinions operate independently of each other
- Fluoro-Elastomer seals
- Stainless Steel
- Pinions

**ML304022 Carpet Gripper**
- CLASS 5
- MAC Valve ready
- Wider jaw configuration
- Ejector pins built into body of gripper

**ML306988 High Speed Cylinder**
- CLASS 5
- MAC Valve ready
- Built-in quick exhaust for high speed actuation
- Single rod or multi-rod configurations possible

**C4467 Carpet Stretcher**
- CLASS 4
- Ensured carpet retention
- Simple design, long life, high clamp force, and fast field maintenance.
- Multiple jaw configurations and tips are available to fit your application requirements.
- Compact envelope size and high clamp force. Series GRM size 2 generates up to 225 lb [1000 N] of clamp force.
- The jaws of the Series GRM Clamp lock in the closed position ensuring part retention if air pressure is lost due to line rupture or power loss.

PHD LitSore CPC4467A
ML309208  
**Corrosion Resistant Plastic Rotary**  
CLASS 5  
Constructed of PET and stainless steel materials especially for wash down environments.  
Direct drop-in replacement  
Option to repair the actuator if necessary  
Reduced down time due to reliability and long life expectancy of the PHD product  
Reduced product waste

ML302807  
**Volumetric Pump**  
CLASS 5  
303 stainless steel body, piston, piston rod, adjustment screws, and fasteners  
Adjustment screw for volume adjustment  
Additional Buna-N quad seal for added sealing and protection  
Compact design  
PHD LitStore CP302807A

ML307562  
**Polymer PET Long Jaw Travel Gripper**  
CLASS 5  
Synchronized jaw travel  
Long jaw travel  
PET plastic body  
Stainless steel jaws

ML307784  
**Plastic Slide**  
CLASS 5  
FDA approved plastic Rod wipers  
Stainless steel guide shafts

ML308000  
**Plastic Cylinder**  
CLASS 5  
FDA compliant polymer and stainless components

ML305001  
**Plastic Volumetric Pump**  
CLASS 5  
FDA approved plastic body for corrosion resistance

ML308838  
**Polymer PET Plastic Cylinder**  
CLASS 5  
Designed for part production in a deionized water environment  
Fully field repairable  
Simple design, long life  
Double-acting  
Longer bearing surface when compared to other cylinders  
PHD LitStore CP308838
ML30077 3 Jaw Gripper
CLASS 5
Direct drop-in to an existing gripping device
Three jaw construction
0 degree closed/16 degrees open
PET body/Stainless steel jaws
Food grade lubrication
Stainless steel tooling included
Integrated push to connect fittings
PHD LitStore CP310077

ML308978 Tip Gate Replacement Cylinder
CLASS 4
Robust Series CV Cylinder design
Replaceable shock absorbing bushing
Direct drop-in to existing competitor’s cylinders
Standard 4” stroke, other strokes are available, consult PHD
Designed with stainless steel bolt and washers
PHD LitStore CP308978

ML302550 Slide Gate Cylinder
CLASS 4
Direct drop-in to existing competitor’s cylinder.
Bore is 32 mm diameter
Strokes designed are 6, 7, 8, 9, and 11 inches.
Other strokes are available.
All units include a fastener kit which contains all hardware for replacement.
Incorporates a 12 mm oversized rod for durability.
Smooth deceleration and quiet operation.
PHD LitStore CP302550

ML307246 Corrosion Resistant Compact Heavy Duty Slide
CLASS 4
100% corrosion resistant
Materials used - hardcoat aluminum for maximum corrosion resistance
Long life and field repairable
Large guide shafts
Heavy duty, rugged
Stainless steel stop collars
Bumpers
PHD LitStore CP307246

ML304096 Complete Stainless Steel cylinder with Stainless Steel Cover
CLASS 5
Valve attached to cylinder
Stainless Steel cover protects the valve from caustic wash down

A Tip for Tip Gates
Customers with vibratory conveyors sometimes experience excessive wear in the mount holes of the fork mount. The high frequency vibrations of the conveyors that feed the product cause this.

Our tip gate cylinder design provides a replaceable shock absorbing wear bushing which extends the life of the cylinder in this demanding application, reducing downtime and inventory costs.

ML308978 can be ordered in the length needed to drop-in and replace the current tip gate actuator to the bagging machines.
ML306079 Variable Pick Head
CLASS 5
- Ideal for final packaging process
- Motor driven pitch
- Pneumatically driven vertical slides

ML305289 Dual Gripper
CLASS 5
- 2 sets of synchronized jaws
- Each set of jaws in independently operated
- Multi-jaw gripper
- Tight positional tolerance

ML302190 Crown Thruster
CLASS 5
- Low breakaway unit
- Three, 20 mm diameter bore built cylinders provide the thruster motion
- Stroke is 1.12 inches
- Piston rods are 3/8 in diameter
- Three 8 mm diameter guide shafts for support
- Weighs 2.37 lbs.
- PHD LitStore CP302190

ML305422 Replacement Cylinder
CLASS 5
- Low breakaway
- Customer specified tool plate configuration
- .500 bore x 1 1/4 in stroke
- Incorporates PHD’s CT design attributes

Making Complex Automation Simple
• Increased Production • Reduced Downtime • Lowest Cost of Ownership
ML305733 Corrosion Resistant Plastic Slide
CLASS 5
100% corrosion resistant
Materials used - PET & stainless steel
Rod scrapers
No grooves in body - easy to wash down, eliminating areas for bacterial growth
Stainless steel mounting inserts
Lightweight slide
Large guide shafts
Dual bore slide
PHD LitStore CP305733

ML309840 Rotary Actuator for Solar Panel Manufacturing
CLASS 4
High torque, heavy duty
Wide variety of options and accessories
Free floating aluminum pistons with pressure and wear compensating piston seals provide long life and low friction
Heavy duty sealed ball bearings ensure shaft stability under heavy and high impact loading
Double rack for increased torque capability and 0° backlash at end of rotation
Output torque at 5100 in-lb at 90 psi

ML303439 Stainless Steel Slide
CLASS 5
316 Stainless Steel
Wash down environment
Long life

ML303257 Round Thruster
CLASS 5
20 mm x .625 in stroke
12 mm guide shafts
Easily accessible retract stroke adjustment

ML302657 Polymer Series GRW with Stainless Steel Jaws
CLASS 4
PET body and bushing
Stainless steel jaws and jaw guides
Fluoro-Elastomer seals
Jaw guides and seals lubricated with cleanroom compatible grease

ML304239 Pick Head Slide
CLASS 5
Manifold ported
Precision housing movement
Direct drop-in replacement
.375 in stroke per rail

Alternate Materials
Low Breakaway Units
Conformal Coating
Automated Circuit Board Routing/Depaneling
Wet Processing
Solder Paste or Reflow
Adhesive Application/Conformal Coating

Final Packaging
Alternative Materials
Low Breakaway Units
Conformal Coating
Automated Circuit Board Routing/Depaneling
Wet Processing
Solder Paste or Reflow
Adhesive Application/Conformal Coating

ML303025 PET Replacement Gripper
CLASS 5
Features PET body and cover with stainless steel jaws, jaw driver, and fasteners; providing protection in deionized water applications and eliminates the need for protective jaw boots
Compact, lightweight design allows for maximum application flexibility
Double-acting for use in both internal and external gripping applications
This gripper accepts select competitor switches, saving hours of downtime associated with switch change out. Contact PHD for more information.
Other configurations are available
Units are fully field repairable
PHD LitStore CP303025

www.phdinc.com/unlimited
Stacker Application

Problem: There was no space for a slide or similar tool to address the huge side loads encountered. The current cylinder has an enlarged snout with a large nose bearing. The unit fails frequently and requires a rebuild. The current solution is attached by a proprietary cable that undergoes constant flexing.

Solution: This cylinder can be located underneath the rotating table in the stacker. Our cylinder is used to extend to push finished, stacked, and banded magazines onto the conveyor, then retracts back to the home position to push the next completed bundle. See ML308995 above.
ML310053 Press Cylinder
CLASS 5
63 mm x 45 mm stroke
1/8 BSPP ports
Long life bushing and wiper seal
Direct drop-in replacement cylinder for MAN Roland press cylinder

ML310417 Impression Cylinder
CLASS 5
Replacement cylinder for a Speedmaster Heidelberg press
100 mm bore x 30 mm stroke
Back to back
MAC Valve ready
Long life and consistent response speed

ML310456 Blanket Wash Cylinder
CLASS 5
Direct replacement for a Heidelberg blanket wash cylinder
Universal - rod can be on either side
40 mm bore x 10.5 mm stroke
16 mm rod
1/8 BSPP ports
Long life seals and bushings

ML309911 Chain Tension Cylinder
CLASS 4
Replacement for a Univer K200-050-0200 FM PHD's Series CV Cylinder
50 mm bore x 200 mm stroke
Double power
Manifold Ported Grippers Load Test Station
Modified for any industry that requires a minimal space array of grippers. In this example, an array of four grippers is manifold mounted to a crossbar of a robotic arm. The grippers pick up the machined tubes and reposition them into a test station. Due to space constraints, the grippers cannot have external air fittings. Each gripper can be rotated to the required positions without re-machining the mounting holes.
**ML21538 Hydraulic Steel Gripper**
CLASS 5
- Hydraulically driven
- Manifold ported for simplified plumbing
- Long jaw travel in a compact package
- Simple construction allows the grippers to be repaired in the field for extended life and value.
- Steel body and jaw covers with corrosion resistant plating extend life in harsh environments

**Machine Loader For Machining Of Castings**
In this application example, castings are loaded and unloaded in a machining center. One gripper brings in a raw casting. A second gripper picks up a finished part before the raw casting is placed in the machine.

**ML308248 Three Position Synchronized Rail Gripper**
CLASS 5
- Ground rail delivers high precision with minimal deflection
- 12 mm bore with 1:1 power to jaw force output
- Jaws are synchronized via common pinion
- Jaw positions at closed 0.00", 1.00", and 2.67"
- Intermediate jaw position repeatable to ± .005"
- Air centered intermediate position for use with pressure centered valve-requires only two airlines!
- Switch ready for PHD Series 6790 Switches

**ML304024 Gripper with Balluff BIL Transducer**
CLASS 5
- PHD's Series GRS and GRL Grippers can be modified to accept the Balluff Series BIL (non-contact analog) position transducer. These custom grippers can grip parts that vary in size while providing continuous position feedback to the controller.
- The Balluff Series BIL position transducer provides a 0 to 10 Volt feedback signal.
- Feedback from the transducer is based on gripper jaw position.
- A sensor cover is provided to protect the PHD magnet from external contaminants (ML# 304024 only).
- Balluff sensor is protected from the environment (IP67).

**ML309749 Modular Device**
CLASS 5
- Modular device
- Two grip and rotate devices incorporated into one assembly
- Mounting configuration designed to adapt directly to customer’s robot

**ML310665 Lightweight Gripper**
CLASS 4
- GRW size 16 design
- PET body and aluminum jaws for lighter weight
- Longer than normal travel

**ML219177 Mono Gripper**
CLASS 4
- Long jaw travel
- Spring assist closed
- One fixed jaw to maintain accurate registration on gripped parts.
- Simple construction allows the gripper to be easily repaired in the field for extended life and value.

**ML305843 3 Jaw Heavy Duty Rim Gripper**
CLASS 5
- Large 3 jaw gripper
- 300 mm diametral travel
- PHD LitStore CP305843
**Conveying Solutions**

**ML309534 Valve Ready Slide**
CLASS 4
MAC Valve ready
Valve can mount on either side of slide housing
32 mm bore x 25 mm stroke
Tool plate designed to customer’s specifications

**ML307537 Staging Stop**
CLASS 5
Direct replacement
Pawl locks in up position (even with loss of air pressure)
Two sets of switch mounting locations
Field repairable
Rebuild and seal kits available
Rated life: 2 million cycles @ .5 lbf-in kinetic energy absorption

**ML310573 Polymer Staging Stop**
CLASS 5
MAC Valve ready
Compact design
12 mm bore
Unique design eliminates the need for linkages
Pawl locks in the up position
**ML300199 Can Style Cylinder**  
CLASS 4  
Round body with external seals to fit into existing casting  
32 mm bore x 1 in stroke  
Hardened piston rod

**ML310446 Tray Dumper Slide**  
CLASS 5  
Modular device  
MAC Valve ready  
Long life front wheel supplied with unit  
25 mm bore x 3 in stroke  
Incorporates PHD’s Series SAH Slide  
Rugged construction

**ML302796 Conveyor Cylinder**  
CLASS 4  
Uses PHD’s standard Series CV Cylinder components  
Designed for high speed with the incorporation of the MAC 400 Series valve  
Fully ported  
Field repairable  
Modular design  
This cylinder and valve combination offers the customer a faster response time when compared to the standard Series CV Cylinder. Used as a high speed diverter on a conveyor system.

**ML309548 Cantilever Rail Slide**  
CLASS 5  
Cantilever slide with rail bearing  
32 mm x 250 mm  
Shock absorber ready  
Switch ready

**ML310064 Heavy Duty Non-Rotating Cylinder**  
CLASS 5  
32 mm x 1-1/2 in stroke  
Non-rotating cylinder  
MAC Valve ready  
Combines PHD Series LCS Escapement and Series CTS Cylinder technology

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Stop  
Divert  
Eject  
Reject  
Snug  
Accumulate  
Flip  
Feed  
Stack  
Turn  
Locate  
Rotate  
Push  
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Unique Applications & Replacements

Unique Applications

ML306580 CNC Quick Change Gripper
CLASS 5
Single acting hydraulic gripper, operates using pressurized coolant through the machine’s spindle.
Mounting to fit CNC tool holder
Fits into machine’s tool carousel
Designs available to fit all styles of tool holders
Reduce machining time by repositioning parts without stopping machine
Automated loading and unloading of parts (lights out operation)
Jaw blanks easily machinable and sold separately. Consult PHD.
PHD LitStore CP306580

ML308635 Series GRB Fixed Jaw Gripper
CLASS 4
Series GRB11-2-20 x 180 gripper
Fixed jaw
Rated for 500°F
Unique color jaws

ML306457 2:1 Air Booster with MAC Valve
CLASS 5
Air booster
2:1 ratio
MAC Valve direct mount ready

ML302516 High Speed Cylinder with MAC Valve
CLASS 4
High speed PHD Series CV Cylinder
Manifold mounted valve

ML301089 / ML225070 / ML302658 Replacement Cylinders
CLASS 4
PHD cylinder designed to replace specialized design and manufacturing cylinder SDM-1783
PHD cylinder incorporates many features of the Series CR Cylinder
Design incorporates a stronger rod bushing in place of the standard Series CR rod bushing.
Designed for long life
Single acting for simplicity in plumbing
Field repairable for additional savings
PHD LitStore CP310089

Replacements
ML306487 Specialty Switch Integration
CLASS 4
PHD Series CR Cylinder modified to accept
Turch transducer

ML307749 Long Life Hole
Punch Cylinder
CLASS 5
Hole punch cylinder for a Park Air machine
Ready for a .375 in diameter die
Spring return

ML304667 4 Jaw Long Travel Gripper
CLASS 5
4 jaw synchronized gripper
25 mm travel per jaw

ML310165 Double Series GRS Gripper
CLASS 5
2 Grippers in one body

ML307584 / ML304302
Angular Replacement Gripper
CLASS 5
Replacement grippers
Direct drop-in replacement
Incorporates PHD’s long life internal
components

ML309230 Tool Carrier Slide
CLASS 5
Drop-in replacement
20 mm bore x .899 in stroke
Proximity switch ready for Balluff BES switch

ML304667 4 Jaw Long Travel Gripper
CLASS 5
4 jaw synchronized gripper
25 mm travel per jaw

ML303903 High Speed Lamination
Feed Cylinder
CLASS 5
Long life seals
Manifold mounting of MAC valve to cap

ML308212 Hydraulically Operated
Lube Dispenser
CLASS
Drop-in replacement for a Lincoln
Centro-Matic Pump

www.phdinc.com/unlimited
**CLAMPS**

- **PA Swing Arm Clamp**
  - Ideal for a wide variety of automated part holding and transfer applications

- **PEC Arm Over Clamp**
  - Superior part holding for assembly and welding applications
  - Up to 900 in-lb [102 Nm] torque

- **PLK Pin Locating Clamp**
  - For part holding and positioning in weld areas
  - Enclosed finger design keeps weld slag out
  - 50 mm bore

- **PB Swing Arm Clamp**
  - Ideal for part holding and transfer welding applications

**CYLINDERS**

- **CR and CT Cylinders**
  - Compact size
  - 8 bore sizes from 12 to 63 mm

- **SFM Slide**
  - Multiple midstops
  - Space saving rodless slide design
  - Lowest deflection and highest moment capacity combination in the industry

- **SIP Slide**
  - Low profile design utilizes rail bearing technology for smooth precision movement
  - Multiple mounting surfaces
  - 3 sizes with up to 2.953" [75 mm] of travel
  - Typical loads up to 4.5 lb [20 N]

- **SHP Slide**
  - Compact design utilizes rail bearing technology for smooth precision movement
  - Multiple mounting surfaces
  - 3 sizes with up to 2.17" [55 mm] of travel
  - Typical loads up to 2.53 lb [11.25 N]

- **SM Slide**
  - Precision ball or polymer bushings
  - Smooth linear motion at twice the thrust of a single bore cylinder
  - 5 bore sizes with travel lengths up to 6" [150 mm]
  - Typical loads up to 70 lb [311 N]
  - Long life

**ROTARIES**

- **RIS Rotary**
  - Eliminates external air lines
  - High torque
  - High axial load capacity

- **RA Rotary**
  - Retains zero backlash
  - 5 sizes and 6 standard rotations

**SLIDES**

- **GRM Clamp**
  - 13 jaw styles available

- **SFP Slide**
  - Space saving rodless slide design
  - Lowest deflection and highest moment capacity combination in the industry
  - 2 bore sizes with standard travel lengths up to 3400 mm

**GRIPPERS**

- **GRW Gripper**
  - Large tooling surfaces and precision dowel holes for accurate tooling attachment
  - Long tooling lengths and high moment capabilities
  - Reduced deflection

- **GRS Gripper**
  - Low profile, high force
  - Rugged jaw support, hardened jaws and hardcoated bearing surfaces
  - 5 sizes
  - 2 jaw travels each size

- **GRB Gripper**
  - Three total jaw rotations are available 60°, 90°, and 180°
  - 6 sizes
  - Grip forces up to 549 lb [2443 N] at 1.90" [48.3 mm] from pivot

- **GRF Gripper**
  - Low profile to fit limited space applications
  - Jaw covers help prevent contamination
  - Rugged jaw support, hardened jaws, and hardcoated bearing surfaces for long life
  - 4 sizes with grip forces up to 116 lb [516 N]

- **GRK Gripper**
  - Highest grip force in its class
  - Precision jaw movement wear compensating over life of unit
  - High moment capacity for longer tooling and greater part weights

- **EGRK Gripper**
  - Electric parallel gripper with long or short jaw travels with high force or high speed
  - Precision jaw movement wear compensating over life of unit

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**PHD STANDARD**

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For more information, request the PHD Clamp Binder.