Custom Products & Services, Inc.
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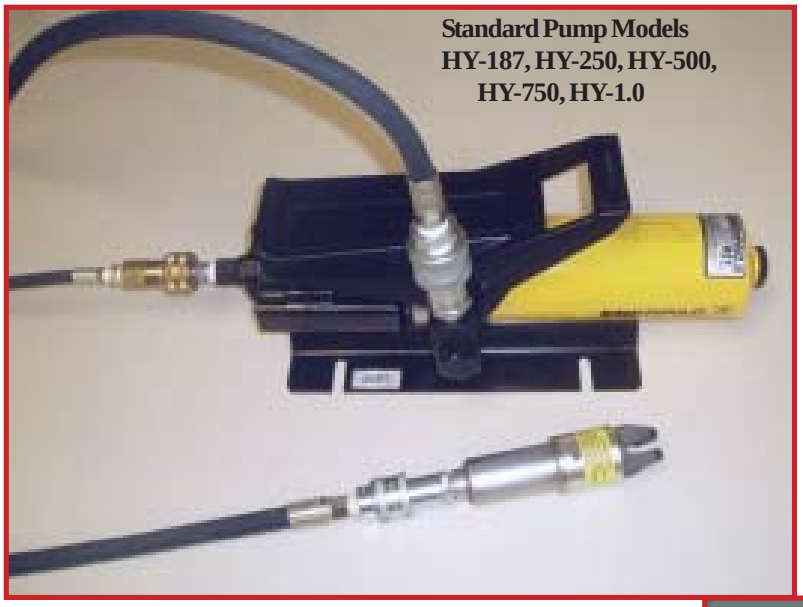
HY-SERIES HYDRAULIC PINCH-OFF TOOLS



Standard Pump Models
HY-187, HY-250, HY-500,
HY-750, HY-1.0

Pinch-off and hermetically seal (cold weld) OFHC Copper, high purity nickle tubing or equal.

Equally effective for high / low pressure or vacuum applications.

Models available for high or low volume applications.

HY-187: For tubing 0.187" Dia. or smaller
HY-250: For tubing 0.250" Dia. or smaller
HY-500: For tubing 0.375"-0.500" Dia.
HY-750: For tubing 0.625"-0.750" Dia.
HY -1.0: For tubing 0.875"-1.00" Dia
(*Custom Configurations available*)

Hand Set & Pinch Jaw
#HYP-500 Shown

Remote Footswitch (-F) Models
HY-187-F, HY-250-F,
HY-500-F, HY-750-F, HY-1.0-F

CALL TOLL-FREE: 888-444-1202 **WEBSITE: www.custom-products.com**

APPLICATION DATA

The HY-Series Hydraulic Pinch-Off tools were developed to produce a permanent, bilateral seal in ductile metal tubing by symmetrically collapsing (cold welding) and severing tubulation with no loss of vacuum or pressure. Conditions for these cold welds must be correct. Materials of the highest purity, surfaces thoroughly machined and thoroughly cleaned should be used. With the correct conditions, even a small amount of exerted force would bring atoms close enough together to form a metallurgical bond or cold weld.

TUBULATION SELECTION

The most commonly used metal for pinch-off is OFHC Copper (ASTM B68-83, B75-84, B133-83 and B170-82). These materials meet the specifications, chemisty and state of ductility requirements for billet-certified 99.9% pinch-off grade copper. It is important that the material be bright annealed at 650^{o} C to 850^{o} C for 30 minutes in a dry hydrogen atmosphere. This is required because the material will undergo a deformation of approximately 350% during pinch-off.

High-purity nickel (A Nickle, N1270, N1200 or 99.4% nickel ASTM-B161) is another commonly used material. High-purity nickel offers several advantages: (1) Minimal out-gassing during bake out and pinch-off, minimal oxidation and higher temperature bake ability. Nickel tubulation must be fully annealed at 1150^{o} C for 30 minutes before pinch-off.

Good results can also be obtained using aluminum (annealed 3003 H14, 98% classified non-heat treatable), pure iron, gold, platinum, silver and columbium. The cold welded area will be work hardened during the pinch-off. The size and length of the cold welded area will depend on material, type of annealing, cleanliness, wall thickness and radius of the pinch-off anvil inserts in the tool.

PINCH-OFF PREPARATION

The tubular material being used must be totally free of contamination at the weld point. Mechanical or sonic cleaning rather than chemical cleaning just prior to pinch-off yields best cold welds.

The O.D. of the tubing should be polished with 320 grit emery cloth to remove oxide crystals.

The tungsten carbide inserts in the pinch jaws must be cleaned before each pinch-off. Any contamination pressed into the metal at the weld point can injure the cold weld seal. The pinch-off is a cold extrusion and a lubricant can be used to aid the material flow. Clean #10 machine oil works well on most metals. If an oil based lubricant can not be used due the nature of your specific application, then it is recommended that water be used for this purpose prior to each pinch cycle.

During the pinch-off process, pressure mut be applied evenly until the tubing severs suddenly. Any interruption of this process while the material is in a plastic state will result in an incomplete cold weld. Leaks are apt to occur if the pinch-off phase is incomplete and the tubing needs to be "wiggled" to accomplish tubular separation. The HY-Series hydraulic tools will provide a reliable cold welded joint if all of the processes listed above are followed.

AFTER PINCH-OFF

There are a few methods for checking the finished crimp for leakage. Vacuum insulation time rates and electric resistance measurements can be avoided if a sample tube is carried through the entire process, then subjected to a helium test or microscopic examination, using the sample for comparative analysis. Process procedures should be duplicated precisely. Changes as subtle as bending a piece of copper tubing will change its grain structure and work-harden the piece considerably. There also will be significant changes in grain size, crystal structure and ductility occuring during any thermal process such as brazing, bake-out soldering or welding. Therefore, the cold welded joint achieved through the cold weld process should NOT be subjected to any process that involves heating that joint.

The cold-welded section of the tubing should be permanently protected with a plastic cap or epoxy after the pinch-off process is completed, as it is a delicate seal and very sharp.

TYPICAL TUBE DEFORMATION

MODEL NUMBER	TUBING DIA (X .035" Wall)	ELONGATION (Per Side)	FLARE (Razor Edge)	DISTORTION (Min. Stub Length)
HY-187	1/8" - 3/16"	0.050 (1/8")	0.250"	0.187"
HY-250	1/4"	0.050" (1/8")	0.350"	0.250"
HY-500	1/2"	0.055" (3/16")	0.750"	0.500"
HY-750	3/4"	0.075" (3/8")	1.150"	0.750"
HY-1.0	1"	1.00" (1")	1.50"	1.00"

Quotations for custom tool sizes & configurations available

HY-SERIES HYDRAULIC / PNEUMATIC PINCH-OFF JAWS & PUMP SYSTEMS

Standard Hydraulic / Pneumatic Pump

- Footswitch mounted on top of pump body
- Air Actuated Hydraulic Pump
- Source Air Pressure Required: 100-120 p.s.i.
- Water Filter & Lubricator required on air source
- Model #HY-250 shown above.

Remote Footswitch-Hydraulic / Pneumatic Pump

- Air Actuated Hydraulic Pump with remote footswitch
- Source Air Pressure Required: 100-120 p.s.i.
- Water Filter & Lubricator required on air source
- Model #HY-250-F shown above

Optional Electric Pumps

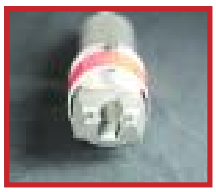
- Model HY-250-E shown above
- Remote Footswitch
- Standard Voltage: 110/120 V

HAND HELD HYDRAULIC HAND SETS

For use with OFHC Copper, High Purity Nickle or Aluminum Tubing.
Models available for pinching off tubes ranging from 0.063" through 1.0" diameter (Page 5)
Jaws utilize precision carbide rollers for creating a hermetic seal.
Hand-guided, 1-step crimp, pinch-off & seal.
Standard jaws are set at 45 degree angle. Other angles available as custom order.
Eliminates the necessity for a secondary solder or braze sealing operation.

HYP-187 & HYP-250

(Use on 0.250" Diameter tubing or smaller)



HYP-500

(Use on 0.375" - 0.50" Diameter tubing or smaller)

HYP-750

(Use on 0.625" - 0.750" Diameter tubing or smaller)

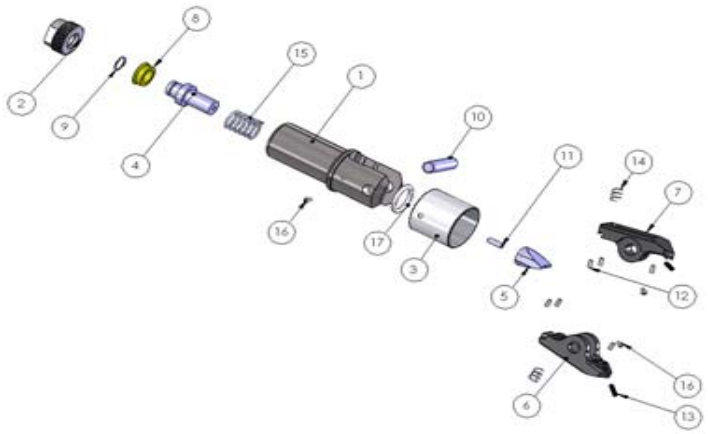
HY-1.0 (NOT SHOWN)

(Use on 0.875" - 1.00" Diameter tubing or smaller)

SPECIFICATIONS

Model #	Pump Style	Handset Wt./Length/Diameter	Jaw Angle	Tubing Dia. Size	Air Pressure Required
HY-187	Standard	1.5 lbs. / 5-1/4" / 1-1/4"	45 Deg.	0.187" or less	100 - 110 p.s.i.
HY-187-F	Remote	1.5 lbs. / 5-1/4" / 1-1/4"	45 Deg.	0.187" or less	100 - 110 p.s.i.
HY-187-E	Electric	1.5 lbs. / 5-1/4" / 1-1/4"	45 Deg.	0.187" or less	100 - 110 p.s.i.
HY-250	Standard	1.5 lbs. / 5-1/4" / 1-1/4"	45 Deg.	0.250" or less	100 - 110 p.s.i.
HY-250-F	Remote	1.5 lbs. / 5-1/4" / 1-1/4"	45 Deg.	0.250" or less	100 - 110 p.s.i.
HY-250-E	Electric	1.5 lbs. / 5-1/4" / 1-1/4"	45 Deg.	0.250" or less	100 - 110 p.s.i.
HY-500	Standard	4.5 lbs. / 8-1/4" / 1-3/4"	45 Deg.	0.375"-0.500"	100 - 110 p.s.i.
HY-500-F	Remote	4.5 lbs. / 8-1/4" / 1-3/4"	45 Deg.	0.375"-0.500"	100 - 110 p.s.i.
HY-500-E	Electric	4.5 lbs. / 8-1/4" / 1-3/4"	45 Deg.	0.375"-0.500"	100 - 110 p.s.i.
HY-750	Standard	12.5 lbs. / 12-1/2" / 2-1/2"	45 Deg.	0.625"-0.750"	100 - 110 p.s.i.
HY-750-F	Remote	12.5 lbs. / 12-1/2" / 2-1/2"	45 Deg.	0.625"-0.750"	100 - 110 p.s.i.
HY-1.0	Standard	25 lbs. / 13.27" / 4.92"	45 Deg.	0.875"-1.00"	100 - 110 p.s.i.
HY-1.0-F	Remote	25 lbs. / 13.27" / 4.92"	45 Deg.	0.875"-1.00"	100 - 110 ps.i.

MAINTENANCE & REPAIR



Dwg #	HY-187	HY-250	HY-500	HY-750	HY-1.0	Description	QTY
1	HYP-6	HYP-6	HYP-6-500	HYP-6-750	HYP-6-100	Housing	1
2	HYP-7	HYP-7	HYP-7-500	HYP-7-750	HYP-7-750	Plug	1
3	HYP-8	HYP-8	HYP-8-500	HYP-8-750	HYP-8-100	Jaw Guard	1
4	HYP-9	HYP-9	HYP-9-500	HYP-9-750	HYP-9-100	Piston Shaft	1
5	HYP-10	HYP-10-250	HYP-10-500	HYP-10-750	HYP-10-100	Cam	1
6	HYP-2	HYP-2	HYP-2-500	HPY-2-750	HPY-2-100	Right Side Jaw	1
7	HYP-1	HYP-1	HYP-1-500	HYP-1-750	HYP-1-100	Left Side Jaw	1
8	HYP-13	HYP-13	HYP-13-500	HYP-13-750	HYP-13-750	Piston Cup	1
9	HYP-14	HYP-14	HYP-14-500	HYP-14-750	HYP-14-750	Snap Ring	1
10	HYP-16	HYP-16	HYP-16-500	HYP-16-750	HYP-16-100	Pivot Pin	1
11	30-01	30-10	22-CLP	20-CLP-2000	20-CLP-2000	Piston Shaft Screw	1
12	HYP-18	HYP-18	HYP-18-500	HYP-18-750	HYP-18-750	Roller Stop	4
13	HYP-17	HYP-17	4-20A	HYP-17-750	HYP-17-100	Roll Pin	2
14	HYP-4	HYP-4	HYP-4-500	HYP-4-750	HYP-4-100	Carbide Inserts	2
15	HYP-12-K2	HYP-12-K2	HYP-12-K2	HYP-12-750	HYP-12-750	Jaw Springs (2)	2
16	HYP-11	HYP-11	HYP-11-500	HYP-11-500	HYP-11-500	Piston Spring	1
17	HYP-25	HYP-25	HYP-25	HYP-25-750	HYP-25-750	Mounting Screw	2
18	18-MSP	18-MSP	15A-01	15A-003	15A-003	Housing O-Ring	1
19	HYP-25	HYP-25	28-01-K10	32-01	32-01	Screw	3

HY-SERIES PUMP & TOOL OPERATION

The HY-Series Hydraulic / Pneumatic pinch-off tools are shipped assembled and ready to install. The hydraulic pressure setting on the pumps will be preset by CPS based upon your specific application. *DO NOT alter the hydraulic pressure settings on these pumps, or the warranty on the hansets / jaws may be voided if breakage occurs. CPS will set and calibrate the pumps before they are shipped.*

- Customer needs to install a quick-disconnect nipple in the "Source Air Input" port on the pump.
- The "Standard" HY-xxx pump Air Input is located at the end of the pump.
- The "Remote-Actuated" HY-xxx-F pump Air Input is located on the end of the handle.

IMPORTANT: These hydraulic / pneumatic pumps utilize an internal air motor which MUST be kept lubricated to prevent premature wear or damage. Install a water filter and lubricator (FRL) to your source air line, within 15-20 ft. from the pump. Air entering the pump MUST be free of moisture, and light air tool oil MUST be injected into the air input side of the pump. If you need an FRL with this tool, please advise and CPS can provide the proper unit.

- Once the source air is connected to the pump, connect the hydraulic hose to the handset.
- Install the pressure gauge to the hydraulic "output" quick coupler on the pump.
- Connect the hydraulic hose to the quick-coupler on the pressure gauge.
- Set the air pressure feeding the pump at 100-110 p.s.i. Lower pressure could damage the air motor.
- **The pumps will be preset and calibrated before shipping. Hydraulic pressure should read between 2500-3500 p.s.i.**
- **If pump pressure gauge reads pressure in excess of 3500 p.s.i., contact CPS before proceeding.**
- The tool is ready to use.
- To activate the "Standard" HY-xxx pump, rock the foot peddle forward to engage the hydraulic valve.
- For -F style pumps, the remote footswitch will engage the pump.
- The pump will pulsate while it builds pressure and the jaws will close (3-5 seconds).
- Rocking the foot peddle to the back position will release the pressure and the jaws will open.
- If the jaws fail to close when the pump is activated, it's likel due to air trapped in the pump or hydraulic line.
- To expel the air from the system, place the pump on your workbench. Hold the handset at a position "lower" than the pump.

PROCESS FOR PINCHING TUBES

- The best quality pinch-off will be accomplished by locating the tubing near the "center" of the jaw.
- When jaws close, the carbide rollers will meet at the tip before they meet at the throat of the jaw.
- For best results, lubricate the pinch rollers with light oil. If oil can't be used, lubricate with water.
- Activate the pump to close the pinch jaws. Maintain pressure until tubing is pinched off.
- ***Cycle time to close jaws & pinch-off tubing: 3-5 seconds. Cycle time to open jaws: 1-2 seconds.***
- Excess tubing will separate completely and be expelled from the jaws.
- Move foot peddle to the "back" position (or release footswitch) to relieve hydraulic pressure and open jaws
- Maximum hydraulic pump pressure should not exceed 3500 p.s.i. Contact CPS if pump pressure exceeds that level. (Jaw breakage can occur with excessive hydraulic pump pressure)

HANDSET AND PINCH JAW WARRANTY

The handset and pinch jaws are warranted against defects in material or workmanship for a period of 1 year. Jaws are NOT warranted against breakage, as CPS can not control actual usage of the tool by the customer.

HYDRAULIC / PNEUMATIC PUMP WARRANTY

The Hydraulic / Pneumatic pumps are warranted by the manufacturer, Enerpac. Enerpac warrants their products to be free of defects in materials / workmanship and will be repaired or replaced at Enerpac expense anywhere in the world. For the location of your nearest service center and detailed warranty information, go to: **www.enerpac.com**

Any pump repair / evaluation must be handled by an Enerpac service center to maintain the warranty.

STANDARD PUMP SPECIFICATION

Hydraulic Pump Maintenance & Operation:

- Mandatory: Install water filter & oiler into the incoming air line to lubricate the internal air motor. Operating these pumps without lubrication (air tool oil) will void the warranty.
- Change hydraulic fluid every 250 running hours using Enerpac hydraulic oil or equivalent.

PA-Series, Air Hydraulic Pumps

ENERPAC
POWERFUL SOLUTIONS. GLOBAL FORCE.

▼ Shown from top to bottom: **PA-1150, PA-133**

PA Series

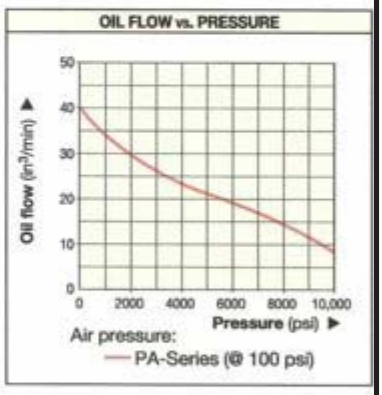
Reservoir Capacity:
36-80 in³

Flow at Rated Pressure:
8 in³/min.

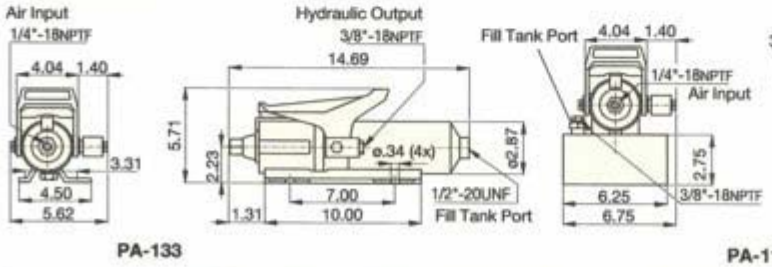
Maximum Operating Pressure:
10,000 psi

PC-66 Reservoir Conversion Kit
Double the reservoir capacity of your existing PA-133 with this easy to install conversion kit.

- **Rugged construction – built for long life and easy service**
- **Swivel coupling simplifies hydraulic connection and pump operation**
- **Three-position treadle provides cylinder advance, hold and retract operation**
- **PA-133 operates in all positions for increased versatility in use and mounting**
- **Base mounting slots provided on PA-133**



Dimensions shown in inches.



PA-133 PA-1150

Used with Cylinder	Usable Oil Capacity (in³)	Model Number	Pressure Rating (psi)	Output Flow Rate (in³/min) No load	Output Flow Rate (in³/min) Load	Valve Function	Air Pressure Range* (psi)	Air Consumption (scfm)	Sound Level (dBA)	Weight (lbs)
Single-acting	36	PA-133	10,000	40	8	Advance/Hold/Retract	60-120	9	85	12
	80	PA-1150	10,000	40	8	Advance/Hold/Retract	60-120	9	85	18

* Recommended Regulator-Filter-Lubricator: RFL-102

REMOTE FOOTSWITCH PUMP SPECIFICATIONS

Hydraulic Pump Maintenance & Operation:

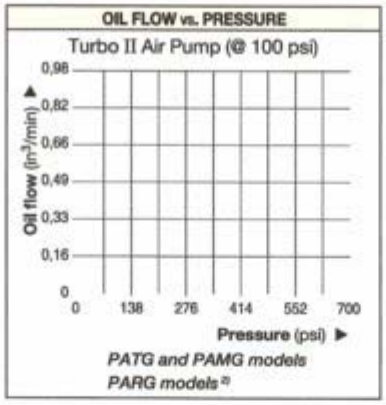
- Mandatory: Install water filter & oiler into the incoming air line to lubricate the internal air motor. Operating these pumps without lubrication (air tool oil) will void the warranty.
- Change hydraulic fluid every 250 running hours using Enerpac hydraulic oil or equivalent.

Turbo II Air Hydraulic Pumps

The PATG-models use a foot or hand operated treadle to control air and valve functions.

The PAMG-models use a treadle with a locking feature and a 4-way manual valve.

The PARG-models use a 15 ft. pendant hose for convenient one-man operation.



PA Series

Reservoir Capacity:
150-305 in³

Flow at Rated Pressure:
10 in³/min.

Maximum Operating Pressure:
10,000 psi

Pressure Rating (psi)	Output Flow Rate (in³/min) No load	Output Flow Rate (in³/min) Load	Model Number	Valve Function	Air Pressure Range (psi)	Air Consumption (scfm)	Sound Level (dBA)
10,000	60	10	PATG & PAMG	Advance/	40-125	12	76
10,000	51 1)	6 1)	PARG	Hold/	40-125	12	76
10,000	48 2)	5 2)		Retract	40-125	8	76

1) Air supply connected at pendant.
2) Air supply connected at pump shown on flow curve.

Pump and Cylinder Sets

Turbo II pumps are also available as sets (Turbo II pump, cylinder, gauge, couplers and hose) for your ordering convenience.

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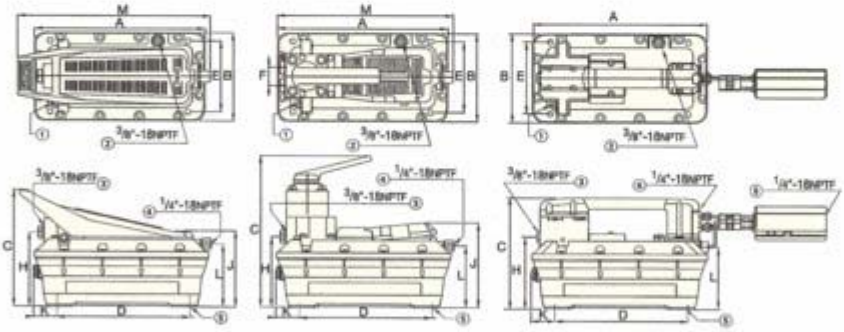

PATG-1102N and PATG-1105N

PAMG-1402N and PAMG-1405N

PARG-1102N and PARG-1105N

① Filtered "Permanent" Tank Vent
② Return-to-Tank/Auxiliary Vent/Fill Tank Port
③ Hydraulic Output
④ Swivel Air Input with Filter
⑤ 4 Mounting Holes for #10 thread forming screw. Max. depth into reservoir = .75"
⑥ Air Input Options

Dimensions (in) A	B	C	D	E	F	H	J	K	L	M	Weight (lbs)	Model Number
12.33	6.49	8.29	9.04	4.00	–	5.15	5.75	1.65	4.43	13.62	18	PATG-1102N*
15.60	7.92	8.22	9.04	4.00	–	5.08	5.75	3.28	4.41	17.20	22	PATG-1105N
12.33	6.49	7.88	9.04	4.00	–	5.15	–	1.65	4.43	–	22	PARG-1102N
15.60	7.92	7.88	9.04	4.00	–	5.08	–	3.28	4.41	–	26	PARG-1105N
12.33	6.49	10.50	9.04	4.00	1.42	5.23	6.00	1.65	4.43	12.60	24	PAMG-1402N
15.60	7.92	10.50	9.04	4.00	1.42	5.19	6.00	3.28	4.41	15.94	28	PAMG-1405N

ENERPAC 99