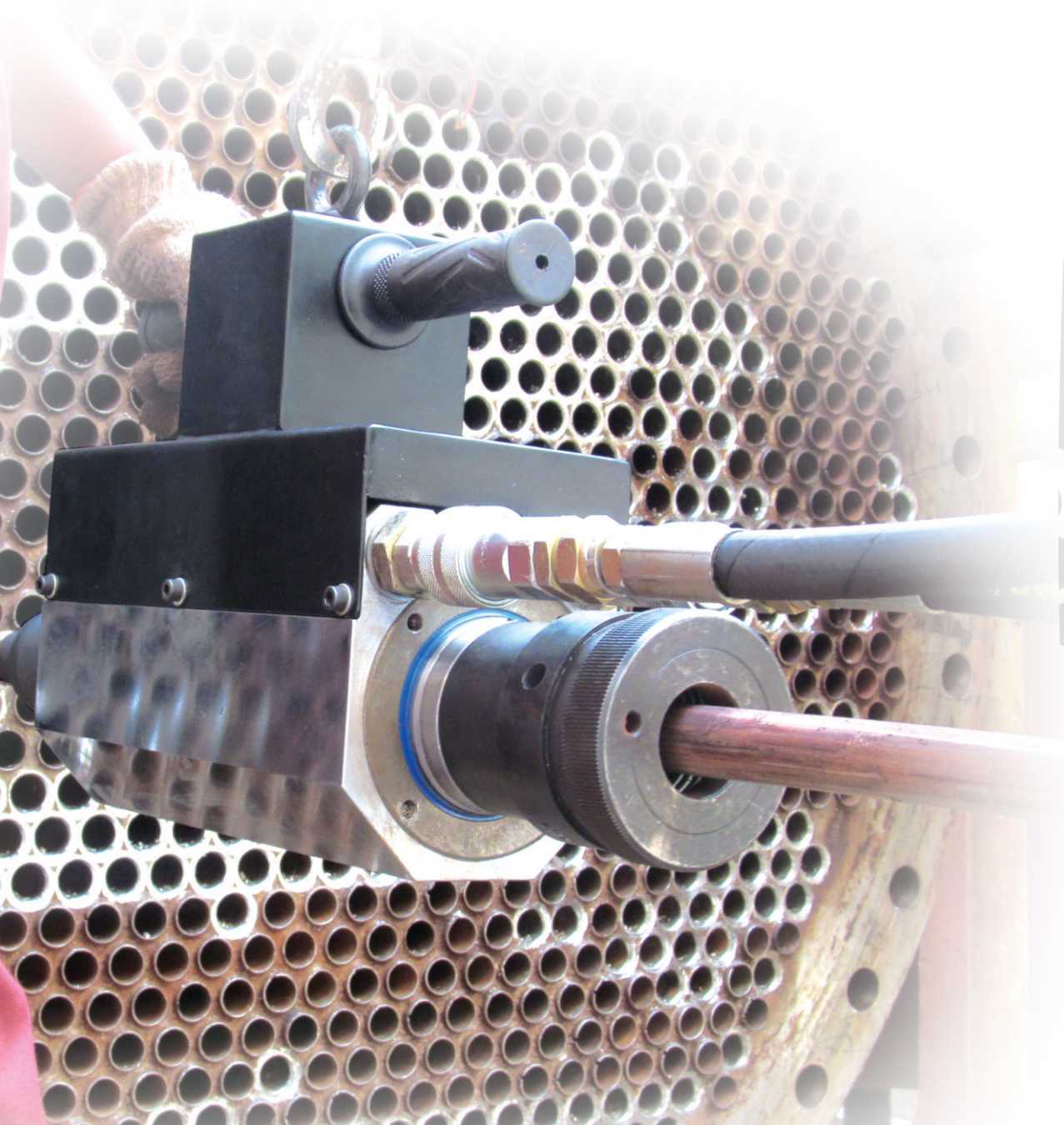




Subzero

The Tube Expander Company...

RETUBING **TOOLS**



WHAT WE OFFER

SUBZERO presents following tube pulling systems for pulling out tubes from Heat Exchanger in oil refinery, & from Condenser in power plant & from Boiler in sugar mills.

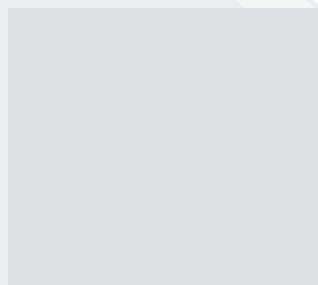
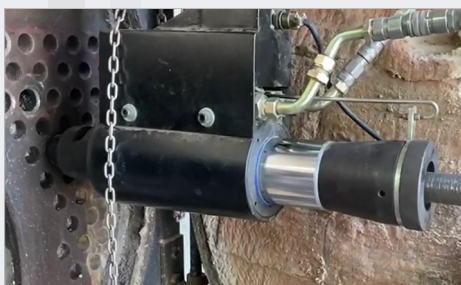
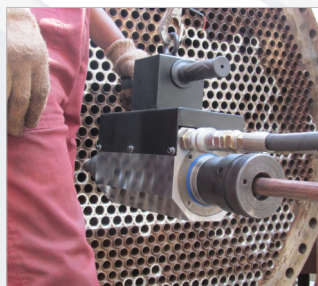
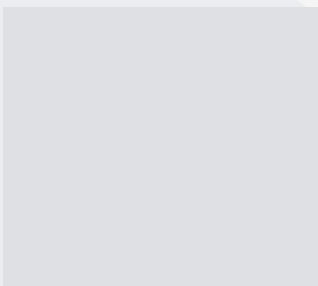
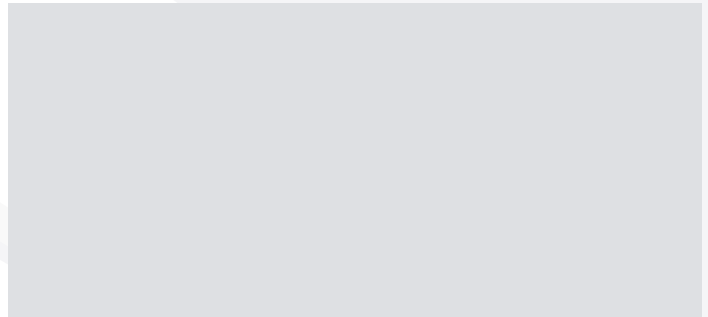
CONTINUOUS TUBE PULLING SYSTEM

- TUBE RUNNER 5 (AUTO) / TUBE RUNNER-9 is a continuous tube pulling machine for removal of tubes from Heat Exchanger, condensers & straight tube boilers.
- Available in hydro-electric & hydro-pneumatic versions.
- Suitable for big maintenance or shutdown jobs



STUB PULLING SYSTEM

- TUBE RUNNER-3 / TUBE RUNNER-2 are only stub pulling machines for removal of cut stubs from tube sheet of U-tube & Bi-drum boilers.
- Available in hydro-electric & hydro-pneumatic versions.
- Suitable for big maintenance or shutdown jobs
- Compact Size.
- SAHP is compact portable stub pulling machine suitable for removal of stubs from heat exchanger / condenser
- Available in pneumatic version only.
- Suitable for thin tube sheet thickness from 20 to 50mm
- Suitable for small maintenance jobs.



CONTINUES TUBE PULLING SYSTEMS

SUBZERO offers continues tube pulling machine for removal of tubes from Heat Exchanger, condensers & straight tube boilers.

- Interchangeable pulling gun with same power pack.
- Pulling gun communicates with power pack via 24VDC control cable or pneumatic control cable.
- Removes tubes without damaging the tube sheet.
- Auto switch over from low pressure high flow to high pressure - low flow on load and again back to low pressure - high flow when load is released.
- Automatic slow pulling of tube during tube sheet to tube bond breakage to minimize breakage of tubes & increase consumable life.
- Significant saving of time over conventional method of tube removal.
- Unit will pull tube continuously thru the gun effortlessly, needing only one man for operation.



TUBE PULLING POWER PACK SPECIFICATION

| SPECIFICATION | TUBE RUNNER- 5 AUTO (Hydro-Electric) | TUBE RUNNER- 9 AUTO (Hydro-Pneumatic) |
|----------------------------|---|---|
| Input | 3 Phase 415 +/- 10%V | Air Supply of 275 CFM @ 90 PSL |
| Power | 3.7 K.W., 5h.P. | 6.7 K.W., 9 HP |
| Max Working Pressure (Bar) | 350 | 350 |
| Weight Without Oil | 220 kg. | 250 kg. |
| Control | 24 Volt DC | Pneumatic Control |
| Hydraulic Hose | ¾" I.D.(Forward), ½"I.D.(Reverse) 5m long | ¾" I.D.(Forward), ½"I.D.(Reverse) 5m long |
| Dimension (mm).(L X W X H) | 1020 X 680 X 960 | 1020 X 680 X 960 |



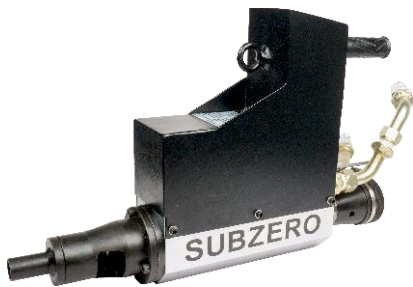
TUBE RUNNER - 5 AUTO (Hydro - Electric)



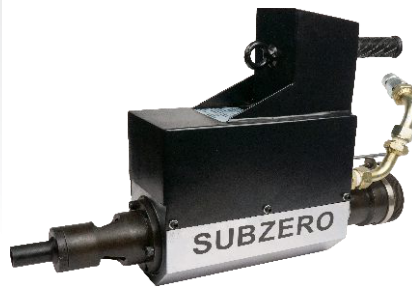
TUBE RUNNER - 9 AUTO (Hydro - Pneumatic)

TUBE PULLING GUN SPECIFICATION

| SPECIFICATION | AUTO PULLER-15 | AUTO PULLER-30 | AUTO PULLER-45 |
|--|-----------------|-----------------|-------------------|
| Max. Capacity (tons) | 15 | 30 | 45 |
| Stroke Length (mm) | 150 | 150 | 150 |
| Pulling Speed With TUBE RUNNER- 5 / 9 Auto | 5.0 | 3.0 | 2.0 |
| Max. Dia. Through Gun (mm / inches) | 25.4 / 1 " | 38.1 / 1 ½ " | 76.2 / 3 " |
| Weight (kg) | 26 | 38 | 78 . |
| Max. Working Pressure (bar) | 350 | 350 | 350 |
| Dimension (mm) (L x W x H) | 453 x 255 x 270 | 520 x 250 x 510 | 495 x 332 x 346.5 |



AUTO PULLER - 15



AUTO PULLER - 30



AUTO PULLER - 45

RECOMMENDED TUBE PULLING ACCESSORIES

SUBZERO recommends following accessories to aid faster removal of tubes and stubs.

- IMPACT WRENCH - For tightening & loosening of tube pulling mandrel inside the tube ID.
- SPRING BALANCER - For load free hanging of tube pulling gun during tube pulling operation.

TUBE PULLING CONSUMABLES

| ITEMS | SPECIFICATION FOR ORDERING |
|----------------------|--------------------------------|
| Tube pulling mandrel | OD & ID of tube |
| Pulling Collar | OD of tube & pulling gun model |
| Front Pulling jaw | OD of tube & pulling gun model |
| Rear Pulling jaw | OD of tube & pulling gun model |



TUBE PULLING MANDREL



| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|-------|----------------------------|-------------|------------|--------|----------------------|
| INCHES | MM | MM | INCHES | | | |
| 3/8" | 9.53 | 6.5-7.5 | 0.260-0.295 | 5/16" | PM-7 | AUTO PULLER - 15/30 |
| | | 7.5-8.5 | 0.295-0.335 | 5/16" | PM-8 | |
| 1/2" | 12.70 | 8.5-9.5 | 0.335-0.375 | 3/8" | PM-9 | |
| | | 9.5-10.5 | 0.375-0.415 | 3/8" | PM-10 | |
| | | 10.5-11.5 | 0.415-0.455 | 3/8" | PM-11 | |
| | | 11.5-12.5 | 0.455-0.595 | 3/8" | PM-12 | |
| 5/8" | 15.88 | 12.5-13.5 | 0.495-0.535 | 1/2" | PM-13A | |
| | | 13.5-14.5 | 0.535-0.570 | 1/2" | PM-14A | |
| | | 14.5-15.5 | 0.570-0.610 | 1/2" | PM-15A | |

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|-------|----------------------------|-------------|------------|--------|----------------------|
| INCHES | MM | MM | INCHES | | | |
| 3/4" | 19.05 | 12.5-13.5 | 0.495-0.535 | 5/8" | PM-13 | AUTO PULLER - 15/30 |
| | | 13.5-14.5 | 0.535-0.570 | 5/8" | PM-14 | |
| | | 14.5-15.5 | 0.570-0.610 | 5/8" | PM-15 | |
| | | 15.5-16.5 | 0.610-0.650 | 5/8" | PM-16 | |
| | | 16.5-17.5 | 0.650-0.690 | 5/8" | PM-17 | |
| | | 17.5-18.5 | 0.690-0.730 | 5/8" | PM-18 | |
| 7/8" | 22.22 | 17.5-18.5 | 0.690-0.730 | 5/8" | PM-18S | |
| | | 18.5-19.5 | 0.730-0.768 | 5/8" | PM-19S | |
| | | 19.5-20.5 | 0.768-0.807 | 5/8" | PM-20S | |

TUBE PULLING MANDREL

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|------|----------------------------|-------------|---------------|-------|-------------------------|
| INCHES | MM | MM | INCHES | | | |
| 1" | 25.4 | 18.5-19.5 | 0.730-0.770 | 3/4" | PM-19 | AUTO PULLER - 15/30 |
| | | 19.5-20.5 | 0.770-0.810 | 3/4" | PM-20 | |
| | | 20.5-21.5 | 0.810-0.845 | 3/4" | PM-21 | |
| | | 21.5-22.5 | 0.845-0.885 | 3/4" | PM-22 | |
| | | 22.5-23.5 | 0.885-0.925 | 3/4" | PM-23 | |
| | | 23.5-24.5 | 0.925-0.965 | 3/4" | PM-24 | |

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|-------|----------------------------|-------------|---------------|-------|-------------------------|
| INCHES | MM | MM | INCHES | | | |
| 1.1/4" | 31.75 | 24.5-25.5 | 0.965-1.005 | 1" | PM-25 | AUTO PULLER - 30 |
| | | 25.5-26.5 | 1.005-1.045 | 1" | PM-26 | |
| | | 26.5-27.5 | 1.045-1.085 | 1" | PM-27 | |
| | | 27.5-28.5 | 1.085-1.125 | 1" | PM-28 | |
| | | 28.5-29.5 | 1.125-1.160 | 1" | PM-29 | |
| | | 29.5-30.5 | 1.160-1.200 | 1" | PM-30 | |
| | | 30.5-31.5 | 1.200-1.240 | 1" | PM-31 | |

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|-------|----------------------------|-------------|---------------|-------|-------------------------|
| INCHES | MM | MM | INCHES | | | |
| 1.1/2" | 38.10 | 31.5-32.5 | 1.240-1.280 | 1" | PM-32 | AUTO PULLER - 30 |
| | | 32.5-33.5 | 1.280-1.320 | 1" | PM-33 | |
| | | 33.5-34.5 | 1.320-1.360 | 1" | PM-34 | |
| | | 34.5-35.5 | 1.360-1.400 | 1" | PM-35 | |
| | | 35.5-36.5 | 1.400-1.440 | 1" | PM-36 | |
| | | 36.5-37.5 | 1.440-1.475 | 1" | PM-37 | |

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|------|----------------------------|-------------|---------------|----------|-------------------------|
| INCHES | MM | MM | INCHES | | | |
| 1.3/4" | 44.4 | 37.5-38.5 | 1.476-1.516 | 1" | PM-38/44 | AUTO PULLER - 45 |
| | | 38.5-39.5 | 1.516-1.555 | 1" | PM-39/44 | |
| | | 39.5-40.5 | 1.555-1.594 | 1" | PM-40/44 | |
| | | 40.5-41.5 | 1.594-1.634 | 1" | PM-41/44 | |
| | | 41.5-42.5 | 1.634-1.673 | 1" | PM-42/44 | |
| | | 42.5-43.5 | 1.673-1.713 | 1" | PM-43/44 | |

RETUBING TOOLS

TUBE PULLING MANDREL

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|------|----------------------------|-------------|---------------|----------|-------------------------|
| INCHES | MM | MM | INCHES | | | |
| 2" | 50.8 | 43.5-44.5 | 1.713-1.752 | 1" | PM-44/51 | AUTO PULLER - 45 |
| | | 44.5-45.5 | 1.752-1.791 | 1" | PM-45/51 | |
| | | 45.5-46.5 | 1.791-1.831 | 1" | PM-46/51 | |
| | | 46.5-47.5 | 1.831-1.870 | 1" | PM-47/51 | |
| | | 47.5-48.5 | 1.870-7.909 | 1" | PM-48/51 | |
| | | 48.5-49.5 | 1.909-1.949 | 1" | PM-49/51 | |

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|------|----------------------------|-------------|---------------|----------|-------------------------|
| INCHES | MM | MM | INCHES | | | |
| 2.1/4" | 57.1 | 49.5-50.5 | 1.949-1.988 | 1.1/2" | PM-50/57 | AUTO PULLER - 45 |
| | | 50.5-51.5 | 1.988-2.028 | 1.1/2" | PM-51/57 | |
| | | 51.5-52.5 | 2.028-2.067 | 1.1/2" | PM-52/57 | |

| TUBE OD | | SUITABLE FOR TUBE ID RANGE | | SQUARE A/F | MODEL | SUITABLE PULLING GUN |
|---------|------|----------------------------|-------------|---------------|----------|-------------------------|
| INCHES | MM | MM | INCHES | | | |
| 2.1/2" | 63.5 | 53.5-54.5 | 2.106-2.146 | 1.1/2" | PM-54/63 | AUTO PULLER - 45 |
| | | 54.5-55.5 | 2.146-2.185 | 1.1/2" | PM-55/63 | |
| | | 55.5-56.5 | 2.185-2.224 | 1.1/2" | PM-56/63 | |
| | | 56.5-57.5 | 2.224-2.264 | 1.1/2" | PM-57/63 | |

TUBE PULLING COLLAR

| Suitable for Tube OD | | AUTO PULLER / STUB PULLER 15 | AUTO PULLER / STUB PULLER 30 | AUTO PULLER / STUB PULLER 45 |
|-------------------------|--------|------------------------------------|------------------------------------|------------------------------------|
| MM | INCHES | | | |
| 9.53 | 3/8" | PC-11 | PC-11 | |
| 12.70 | 1/2" | PC-14 | PC-14 | |
| 15.88 | 5/8" | PC-18 | PC-18 | |
| 19.05 | 3/4" | PC-22 | PC-22 | |
| 22.22 | 7/8" | PC-25 | PC-25 | |
| 25.40 | 1" | PC-28 | PC-28 | PC-45/28 |
| 31.75 | 1.1/4" | | PC-34 | PC-45/34 |
| 38.10 | 1.1/2" | | PC-41 | PC-45/41 |
| 44.40 | 1.3/4" | | | PC-45/48 |
| 50.80 | 2" | | | PC-45/56 |
| 57.10 | 2.1/4" | | | PC-45/60 |
| 63.5 | 2.1/2" | | | PC-45/66 |
| 76.2 | 3" | | | |
| 88.9 | 3.1/2" | | | |
| 101.6 | 4" | | | |



COLLAR

TUBE PULLING JAWS

| TUBE OD | | AUTO PULLER - 15 | | AUTO PULLER - 30 | | AUTO PULLER - 45 | |
|---------|--------|------------------|-----------|------------------|-----------|------------------|-----------|
| MM | INCHES | FRONT | REAR | FRONT | REAR | FRONT | REAR |
| 9.53 | 3/8" | PJ-15-1F | PJ-15-1R | PJ-30-1F | PJ-30-1R | | |
| 12.70 | 1/2" | PJ-15-2F | PJ-15-2R | PJ-30-2F | PJ-30-2R | | |
| 15.88 | 5/8" | PJ-15-3F | PJ-15-3R | PJ-30-3F | PJ-30-3R | | |
| 19.05 | 3/4" | PJ-15-4F | PJ-15-4R | PJ-30-4F | PJ-30-4R | | |
| 22.22 | 7/8" | PJ-15-4AF | PJ-15-4AR | PJ-30-4AF | PJ-30-4AR | | |
| 25.40 | 1" | PJ-15-5F | PJ-15-5R | PJ-30-5F | PJ-30-5R | PJ-45-5F | PJ-45-5R |
| 31.75 | 1.1/4" | | | PJ-30-7F | PJ-30-7R | PJ-45-7F | PJ-45-7R |
| 38.10 | 1.1/2" | | | PJ-30-9F | PJ-30-9R | PJ-45-9F | PJ-45-9R |
| 44.40 | 1.3/4" | | | | | PJ-45-11F | PJ-45-11R |
| 50.80 | 2" | | | | | PJ-45-13F | PJ-45-13R |
| 57.10 | 2.1/4" | | | | | PJ-45-14F | PJ-45-14R |
| 63.5 | 2.1/2" | | | | | PJ-45-16F | PJ-45-16R |
| 76.2 | 3" | | | | | PJ-45-17F | PJ-45-17R |
| 88.9 | 3.1/2" | | | | | | |
| 101.6 | 4" | | | | | | |



FRONT JAW



REAR JAW

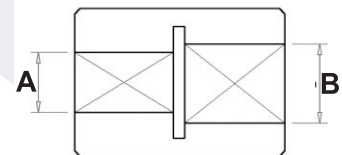
TUBE PULLING ACCESSORIES

AIR IMPACT WRENCH

| MODEL | SUITABLE FOR TUBE PULLING MANDREL MODEL | SQUARE DRIVE |
|----------|---|--------------|
| IMP - 1 | PM - 7 to PM - 24 | 3/4" |
| IMP - 2 | PM - 25 to PM - 37 | 1" |
| IMP - 2A | PM - 38 to PM - 49/51 | 1" |
| IMP - 3 | PM - 50/57 to PM - 95/102 | 1.1/2" |



PULLING SOCKET



| MODEL | A | B |
|--------|-------|-------|
| PS - 1 | 3/4 | 3/8 |
| PS - 2 | 3/4 | 1/2 |
| PS - 3 | 3/4 | 5/8 |
| PS - 4 | 3/4 | 3/4 |
| PS - 5 | 1 | 3/4 |
| PS - 6 | 1 | 1 |
| PS - 7 | 1.1/2 | 1 |
| PS - 8 | 1.1/2 | 1.1/2 |

SPRING BALANCER

| ABOUT | LOAD LIFTING RANGE | SUITABLE FOR PULLING GUN |
|-----------|--------------------|--------------------------|
| SSB - 30 | 20 TO 30 | AUTO PULLER - 15 |
| SSB - 45 | 30 TO 45 | AUTO PULLER - 30 |
| SSB - 90 | 70 TO 85 | AUTO PULLER - 45 |
| SSB - 120 | 100 TO 120 | AUTO PULLER - 60 |



SPRING BALANCER



PULLING SOCKET