



Logansport Machine Company

OPERATION MANUAL

PC SERIES
HYDRAULIC POWER OPERATED CHUCKS

INSTRUCTION MANUAL

Important

For ensuring correct and safe operation, read all operating instructions carefully before attempting to use the chuck.

Please Read And Keep This Manual.



1-1 PRELUDE

Thank you for choosing the “LMC” brand hydraulic power chuck (PC SERIES). Through the use of this operation manual, you will learn to use the power chuck correctly. This will in turn lead to an increase in productivity for your products.

1-2 SAFETY INFORMATION

In order to avoid accidents and operate on the safest level possible, we have indicated safety precautions with this symbol 

PRIOR TO OPERATION, PLEASE READ THIS MANUAL CAREFULLY.

The majority of accidents, without exception, are caused by a lack of following the fundamental rules of safety that pertain to repairing, handling, maintenance and inspection. Prior to operation, you should carefully read the precautions and warnings in this manual. You should not proceed with repairing, handling, maintenance or inspection before fully understanding the rules of safety laid out in this manual. The safety messages are classified as follows:

We will assume no responsibility for any accidents caused by disobeying these precautions.



DANGER

This safety message is used to identify danger areas which could cause serious injury or death.



WARNING

This safety message warns the individual of places where dangerous situations, which could lead to serious injury or death, may occur. This safety message helps to prevent one from encountering the  DANGER areas.



CAUTION

This safety message means that there is a possible chance of being injured or seriously damaging the machine or chuck.



ATTENTION

This safety message means that there is a chance of damaging the machine and/or shortening the machine life.

It is impossible to predict all of the dangerous environments pertaining to repairing, handling, maintenance, and inspection of the power chuck. Therefore, the warnings contained in this manual may not be complete for all environments.

When you proceed with repairing, handling, maintenance or inspection in a way not explained in this manual, the necessary safety considerations are your own responsibility. Please order all parts of products, including the standard hardware articles from Logansport Machine Co.

We will not take responsibility for any troubles encountered by customers who are not using original LMC parts.

Your local distributor and/or Logansport Machine Co.

Address:

Phone:

- SEND IN WARRANTY CARD

Safe operation is necessary for uninterrupted production. Please read and follow the fundamental safety procedures carefully.

 DANGER	<ol style="list-style-type: none">(1) Never open or close the chuck while the spindle is running.(2) When inspecting, exchanging or fixing the chuck, cut off the source of electricity.(3) Never exceed the RPM limit of the chuck.	<p>The workpiece may be thrown from the chuck causing serious machine and/or bodily injury.</p> <p>Unexpected machine movement may cause bodily injury.</p> <p>Grip force of the chuck decreases when RPM increases. The workpiece may be thrown from the chuck causing serious machine and bodily injury.</p>
 WARNING	<ol style="list-style-type: none">(1) Never run the spindle without closing the machine door.(2) The supply and pressure to the cylinder should be restricted so as not to overpower the chuck.(3) The mounting bolts should be torqued with torque wrench. The torque is shown on pg. 17 chart 8.(4) Lubricate the chuck at least once in 8 hours use.(5) The size of the top jaw should be within the range of the grip force table. Concerning the height of standard top jaw, you may operate the top jaw under the lower hydraulic pressure. The relation between top jaw height and thrust of cylinder should be referred to in FIG. 15 through FIG. 25.(6) Longer workpieces need to be machined in conjunction with either a steady rest or tailstock.(7) Never modify the master jaw or body while on the machine.(8) Whenever possible, LMC chucks should be used in conjunction with LMC cylinders.	<p>You may come in contact with the revolving chuck, or damage the jaw.</p> <p>Chuck life is shortened. Parts and bolts may break. Clamp power is reduced suddenly.</p> <p>The chuck may be damaged causing the workpiece to be thrown.</p> <p>Lack of grease causes a decrease in grip force and the workpiece could be thrown.</p> <p>To avoid chatter and poor part quality. More importantly, to avoid the workpiece being thrown from the chuck.</p> <p>The chuck will distort and become damaged.</p> <p>For optimal jaw force, jaw stroke, and performance.</p>

**WARNING**

- | | | |
|--|--|--|
| | <p>(9) Never operate machinery while under the influence of alcohol or cautionary types of medication.</p> <p>(10) Do not operate machinery with gloves, necktie or long hair.</p> | <p>Mishandling and unstable motion can occur.</p> <p>Any of these things may become caught in the revolving chuck.</p> |
|--|--|--|

**ATTENTION**

- | | | |
|--|--|--|
| | <p>(1) When removing the chuck from the machine, use the eyebolt or hanging belt.</p> <p>(2) When clamping the workpiece, be careful not to get your fingers caught in the chuck. After the revolution of the chuck has come to a complete stop, you may handle the workpiece.</p> | |
|--|--|--|

CAUTIONS FOR CUSTOMERS

- In order to avoid danger, the operator should also take into consideration the features of workpieces; such as size, weight, shape, cutting speed, feed and depth of cut of each machine tool in use.
- The allowable maximum speed for each specified workpiece should be determined by the user and should be based upon the necessary grip force. This speed may not exceed the maximum rotating speed of the chuck.
- For special top jaws, users should calculate the dynamic grip force for the workpiece by using the charts in the manual.
- Use a static grip force analyzer, periodically, to monitor the gripping ability of the chuck, thus avoiding the unexpected throwing of a workpiece due to grip force loss.
- Reduce the working force for each machine to avoid overpowering the special parts holding chuck.
- Logansport Machine Co. will not be held responsible for accidents caused by untrained operators.

PRIOR TO STARTING OPERATION, PLEASE READ THIS OPERATION MANUAL THOROUGHLY AND COMPLETELY.

TITLE	PAGE
1 Preface	1
2 Safety Precautions	3
3 Index	5
4 Parts List	6
5 Specifications Sheets	7
5-1 Chuck Specifications	7
5-2 Grip Force and RPMs	8
5-3 The Relation Between Top Jaw Height and Grip Force	14
5-4 The Relation Between Work	17
5-5 Allowable Chuck Grip Force	19
6 Installation	20
6-1 Opening the Crate and Installation Preparations	20
6-2 Manufacture of Draw Tube	20
6-3 Installing the Chuck	21
7 Trial Running	23
7-1 The Precautions for Trial Running	23
8 Formation of Soft Jaw	24
8-1 The Installation of Soft Jaw	24
8-2 The Formation of Soft Jaw	25
9 Precautions for Daily Operation	27
9-1 The Precautions for Usage	28
9-2 The Precautions for Operation	28
10 Maintenance and Inspection	29
10-1 The Grease Supply and Inspection Cleaning	29
10-2 The Maintenance	30
11 Trouble Shooting	31
12 Table of Accessories	32

PC HYDRAULIC CHUCK PARTS NAME AND LIST

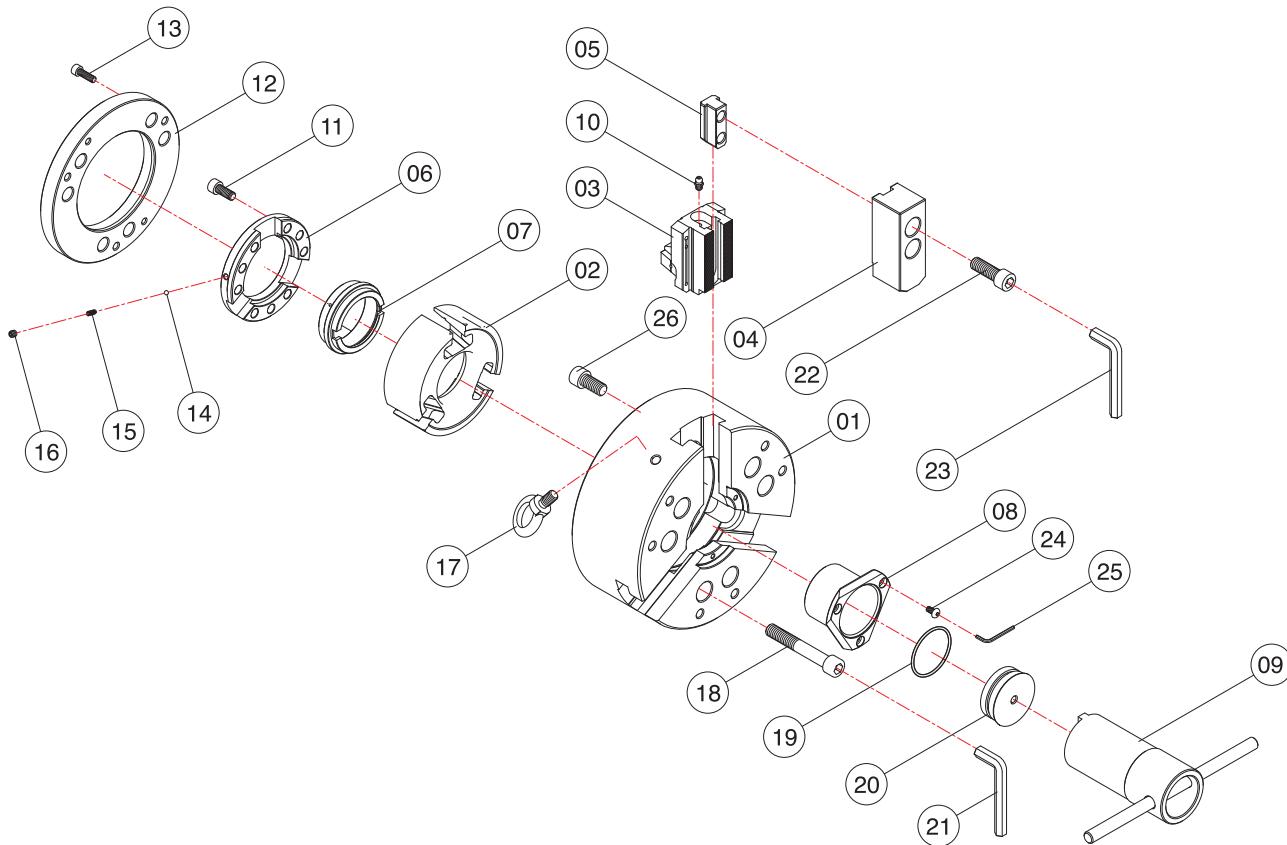


FIG. 1 PC POWER CHUCK PARTSPC

TABLE 1. POWER CHUCK PARTS LIST

No.	Part Name	No.	Part Name
1	Body	14	Steel Ball
2	Wedge Plunger	15	Spring
3	Master Jaw	16	Hexagon Socket Headless Set Screw
4	Soft Jaw	17	Sling Bolt (Accessory)
5	T-nut	18	Chuck Mounting Bolt (Accessory)
6	Plunger Nut	19	O-ring (Accessory)
7	Draw Nut	20	Water Proof Cover (Accessory)
8	Cover	21	Hexagon Pin Spanner (Accessory)
9	Joint Handle (Accessory)	22	Jaw Mounting Bolt
10	Grease Nipple	23	Hexagon Pin Spanner (Accessory)
11	Hexagon Socket Head Cap Screw	24	Hexagon Socket Head Cap Screw
12	Mounting Plate	25	Hexagon Pin Spanner (Accessory)
13	Hexagon Socket Head Cap Screw	26	Hexagon Socket Head Cap Screw

5-1 THE TABLE OF SPECIFICATIONS

TABLE 2. THE TABLE OF SPECIFICATIONS BY MODEL

	Chuck Model			PC-5-34-01	PC-6-46-01	PC-6-46-02	PC-8-52-01	PC-8-66-01	PC-10-78-01	PC-10-82-01	PC-12-93-01
	Item		Unit	Specification							
1	Outside Diameter		mm	135	169	169	210	215	254	256	304
2	Thickness (Not Incl. Top Jaw)		mm	77	91	91	107	108	123	123	130
3	Through Hole Diameter		mm	34	46	46	52	66	78	82	93
4	Jaw Stroke (In Diameter)		mm	5.4	5.7	5.7	7.6	7.4	9	8.8	10
5	Shifter Stroke		mm	10	12.4	12.4	16.5	16	19.5	19	21.7
6	Grip Diameter	Max	mm	135	169	169	210	215	254	256	304
		Min	mm	10	15	20	13	30	37	39	40
7	Maximum RPM (At Maximum Grip Force)		rpm	7000	6000	6000	5000	5000	4200	4500	3400
8	Maximum Grip Force		kgf	3570	5710	5710	8466	8800	11010	11470	14380
9	Balance Grade		G	16	10	10	10	10	10	10	10
10	Weight		kg	8.0	14.4	--	25.7	--	41.8	--	63.3
11	GD ²		kg·m ²	0.02	0.06	0.06	0.15	0.15	0.36	0.36	0.78
12	Maximum Draw Bar Pull		kgf	1730	2140	2140	3360	3400	4280	4440	5500
13	Mounting Bolt Pattern Radius		mm	52.4	52.4	52.4	66.7	75	66.7	66.7	66.7
14	Chuck Mounting Bolts			3-7/16"x3.25"	6-7/16"x3.75"	6-7/16"x3.75"	6-1/2"x4.25"	6-M12x25	6-1/2"x1.25"	6-1/2"x1.25"	6-1/2"x1.25"
15	Draw Tube Thread			M40xP1.5	M55xP2.0	M55xP2.0	M60xP1.5	M72xP1.5	M85xP2.0	M85xP2.0	M85xP2.0
16	Applied Cylinder			P1036	P1246	P1246	P1552	P1666S	P1875	P1882S	P2091

	Chuck Model			PC-12-93-02	PC-12-106-01	PC-12-106-02	PC-15-120-01	PC-15-120-02	PC-18-165-01	PC-21-180-01	PC-24-205-01
	Item		Unit	Specification							
1	Outside Diameter		mm	304	315	315	381	381	455	530	610
2	Thickness (Not Incl. Top Jaw)		mm	130	144	136	165	165	163	166	194
3	Through Hole Diameter		mm	93	106	106	120	120	165	180	205
4	Jaw Stroke (In Diameter)		mm	10	10.6	10.6	11.6	11.6	11.6	10.6	12
5	Shifter Stroke		mm	21.7	23.7	23.7	25.3	25.3	25.3	23	26
6	Grip Diameter	Max	mm	304	315	315	381	381	455	530	610
		Min	mm	40	53	53	40	40	130	115	140
7	Maximum RPM (At Maximum Grip Force)		rpm	3400	3400	3400	2500	2500	2000	1700	1400
8	Maximum Grip Force		kgf	14380	14380	14380	18250	18250	18250	23760	23760
9	Balance Grade		G	10	10	10	6.3	6.3	6.3	6.3	6.3
10	Weight		kg	60	--	54.7	118.6	--	165	196.4	273.3
11	GD ²		kg·m ²	0.78	0.78	0.78	2.45	2.45	4.8	9.3	16.9
12	Maximum Draw Bar Pull		kgf	5500	5500	5500	7240	7240	7240	9080	9080
13	Mounting Bolt Pattern Radius		mm	66.7	85.7	85.7	85.7	85.7	117.5	117.5	117.5
14	Chuck Mounting Bolts			6-1/2"x1.25"	6-5/8"x1.5"	6-5/8"x1.5"	6-5/8"x1.5"	6-5/8"x1.5"	6-M20x40	6-3/4"x1.5"	6-3/4"x2"
15	Draw Tube Thread			M85xP2.0	M115xP2.0	M115xP2.0	M115xP2.0	M115xP2.0	M175xP3.0	M175xP3.0	M175xP3.0
16	Applied Cylinder			P2091	P2091	P2091	P2511	P2511	P2511	P2816	P2816

*When gripped with standard jaw

5-2 THE RELATION BETWEEN GRIP FORCE AND RPM's

5-2-1 CONCERNING THE GRIP FORCE

The power chuck holds the workpiece with grip force produced with energy from the hydraulic cylinder. Grip force changes due to the centrifugal force of the chuck jaws. The grip force decreases as the spindle RPM's increase. This is shown in FIG. 3, the grip force diagram.

5-2-2 GRIP FORCE MEASUREMENT

- (1) The top jaw is "LMC" standard soft jaw.
- (2) The supplied grease is "LMC" recommended grease (refer to pg. 29, table 10).
- (3) The top jaw mounting bolts should be torqued (refer to pg. 21, table 8).
- (4) The draw bar pull is at the maximum allowable.
- (5) The hydraulic unit must supply 20 liters/min. to hydraulic actuator for maximum draw bar pull.
- (6) The correct way to measure in grip force is shown in FIG. 2.

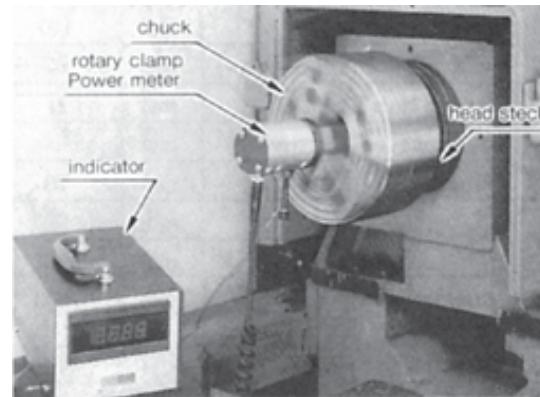


FIG. 2 Method for measuring Clamp force

5-2-3 MAXIMUM CHUCK SPEED (RPM)

- (1) RPM is at its maximum when dynamic grip force is reduced to 1/3 of the static grip force. (Centrifugal force of master jaw and top jaw reduced grip force.)
- (2) Published data based on Wr of "LMC" standard soft jaw.
(Wr = weight x radius of rotation at jaw center of gravity.)
- (3) The draw bar pull is at the maximum for chuck.
* At maximum RPM, the grip force should be larger than the cutting force, and grip force must not reach zero.
- (4) The top jaw should not extend beyond the body of the chuck.
- (5) The master jaw should be in the middle of the stroke.

 WARNING	<ol style="list-style-type: none">(1) The grip force varies greatly depending upon the height and weight of the top jaw, and the lubrication of the chuck, master jaws, and jaw shifter.<ol style="list-style-type: none">a) Gripping at the top of tall top jaws creates a leverage condition in the master jaw ways and reduces the chuck's grip force ability.b) Heavy (large) top jaws create higher centrifugal forces as spindle RPM's increase, thereby reducing the chuck's grip force applied.c) Insufficient lubrication reduces the chuck's ability to generate grip force. *Therefore, it is necessary to check the state of maintenance periodically.(2) Heavy cutting forces at high spindle RPM's create minimal grip force and workpiece may be thrown from chuck.(3) Insure that the actuator produces sufficient draw bar pull and the RPM maximum is as great as the chuck.(4) For I.D. gripping the static grip force should be reduced to 1/3 or less.
--	--

 ATTENTION	<ol style="list-style-type: none">(1) When using a 2 jaw chuck, never operate with the draw bar pull greater than 2/3 of the maximum allowable draw bar pull for the 3 jaw version of the same model chuck.(2) Do not use the chuck with the top jaws loose.
--	---

5-2-4 HOW TO READ THE GRIP FORCE DIAGRAM

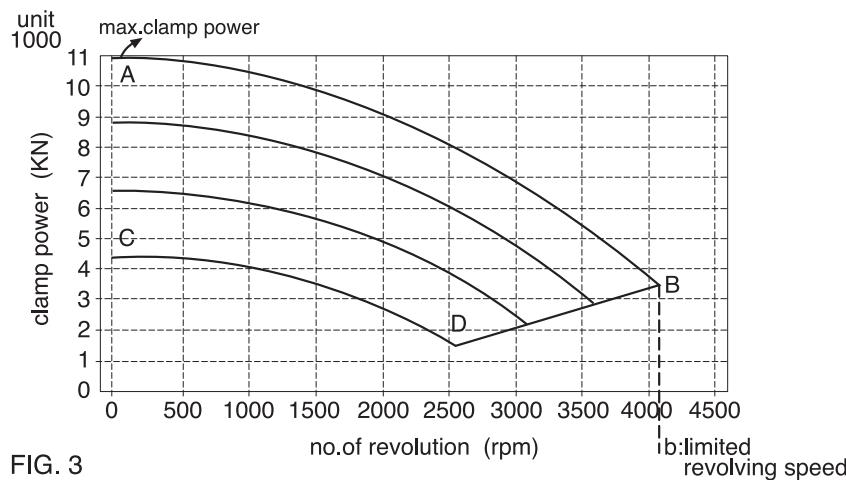


FIG. 3

- (1) Lines AB & CD are grip force curves.
 - a) AB is maximum allowed for chuck.
 - b) CD is example selected by user for lighter grip force.
(e.g. Thin wall part)
- (2) Point A is maximum allowed static grip force. Increasing the RPM it reaches point B, maximum RPM. Note the grip force at this time is 1/3 of the point A value. (1/3 of the static grip force has been set as minimum allowed dynamic grip force.)
- (3) Point C shows a lighter static grip force selected by user
(e.g. due to thin wall parts). Increasing the RPM it reaches point D, maximum RPM.
- (4) Line BD determines maximum RPM for all grip forces selected between points A & C.
- (5) Point D must never be zero or less.

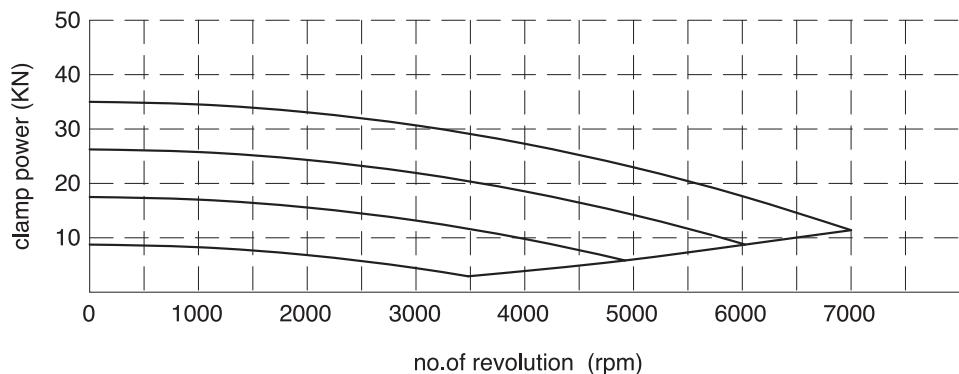
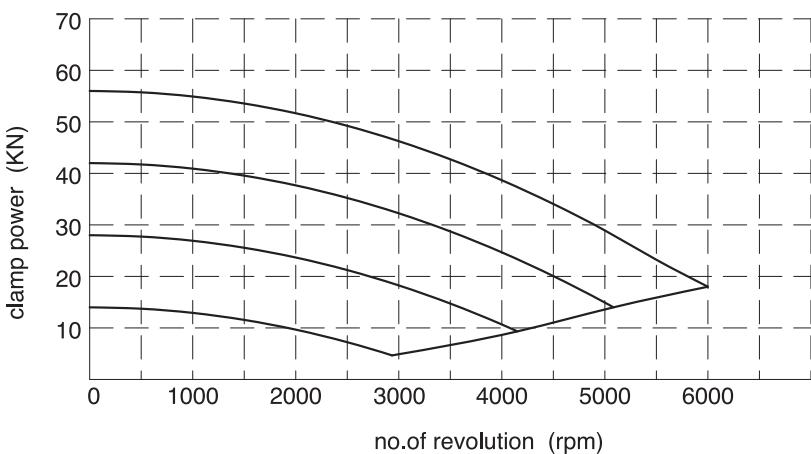
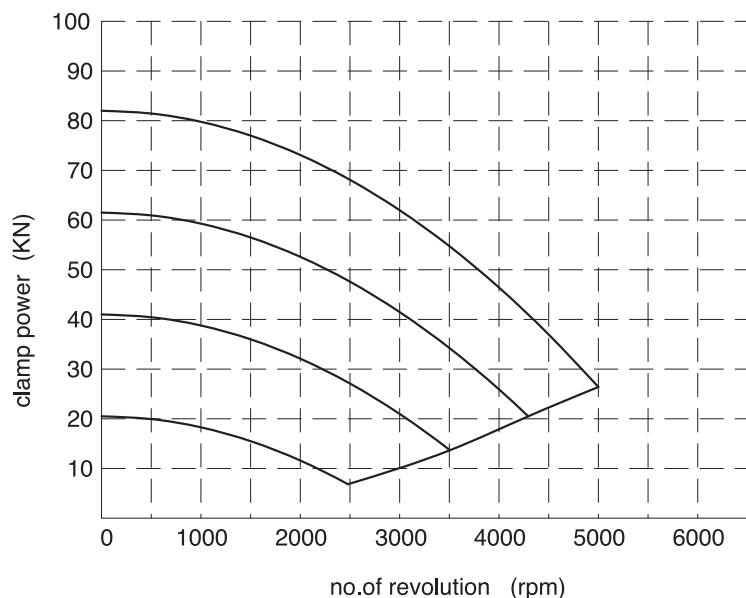
5-2-5 GRIP FORCE GRAPHS FOR VARIOUS CHUCK MODELSFig4.
PC-5-34-01Fig5.
PC-6-46-01Fig6.
PC-8-52-01

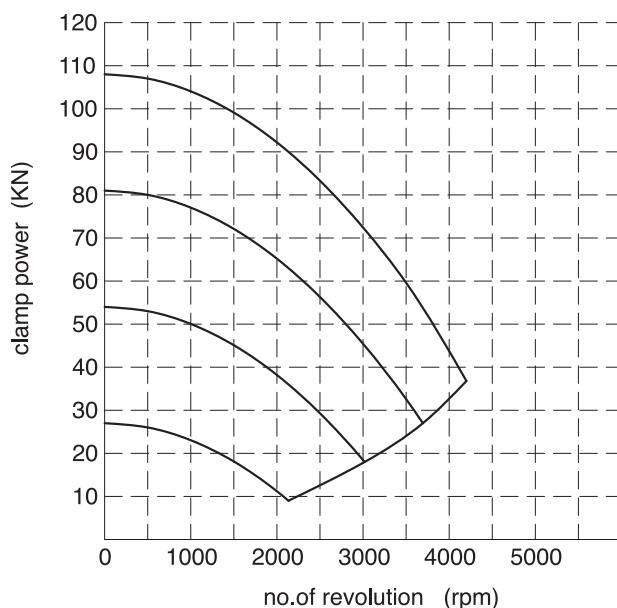
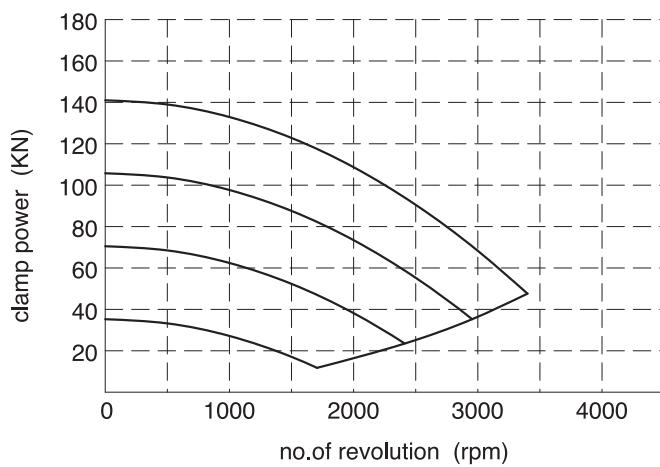
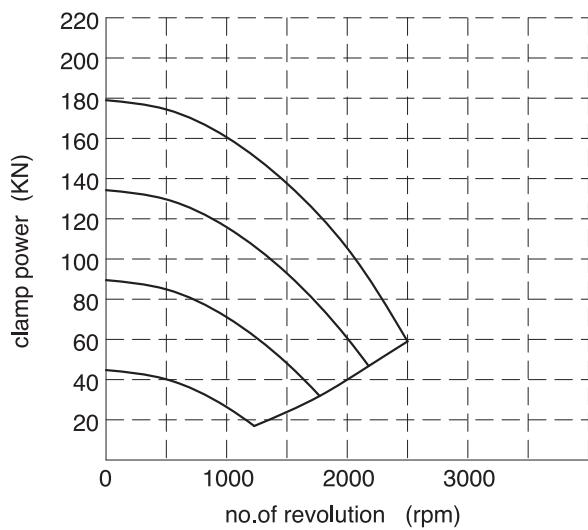
Fig7.
PC-10-78-01Fig8.
PC-12-93-01Fig9.
PC-15-120-01

Fig10.
PC-18-165-01

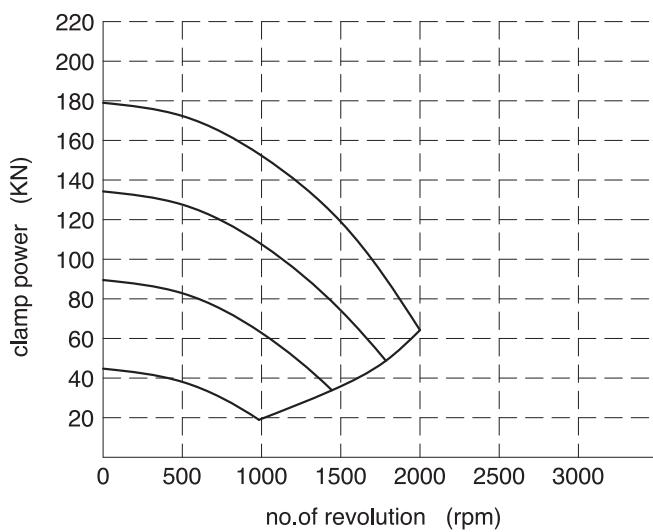


Fig11.
PC-21-180-01

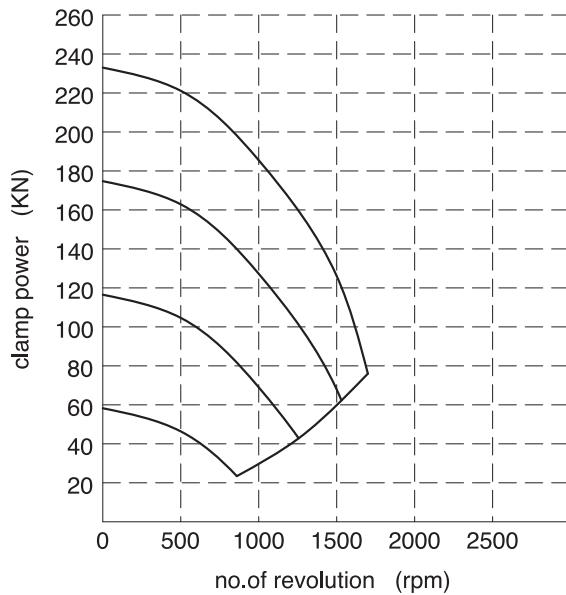
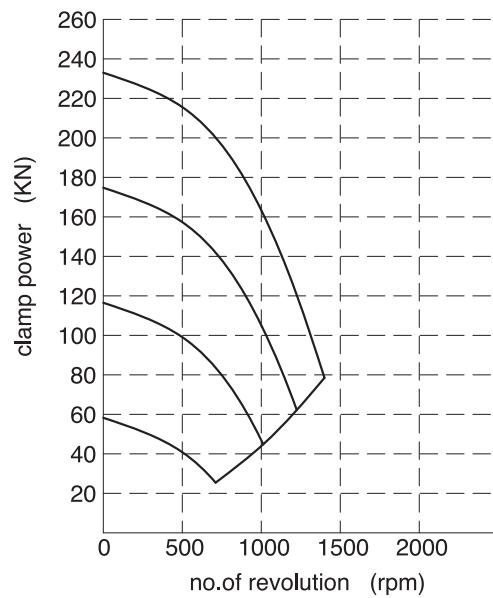


Fig12.
PC-24-205-01



5-3 THE RELATION BETWEEN TOP JAWS AND LOSS OF GRIP FORCE

With higher spindle RPM's the centrifugal force of the revolving top jaw increases, thus reducing grip force. Therefore, please check closely the conditions of clamping and cutting.



WARNING

When using tall soft top jaws (i.e., taller than standard soft top jaws), cylinder pressure must be reduced to avoid deflection of chuck body at master jaw ways.

Chuck Model	Standard Top Jaw Mass-Moment (3 pcs. In total) mr(kg-mm)	Chuck Model	Standard Top Jaw Mass-Moment (3 pcs. In total) mr(kg-mm)
PC-5-34-01	29.8	PC-15-120-01	1312.5
PC-6-46-01	67.5	PC-18-165-01	1472.5
PC-8-52-01	134.4	PC-21-180-01	2802.6
PC-10-78-01	255.6	PC-24-205-01	3450.6
PC-12-93-01	530.7		

Fig13.
PC-5-34-01

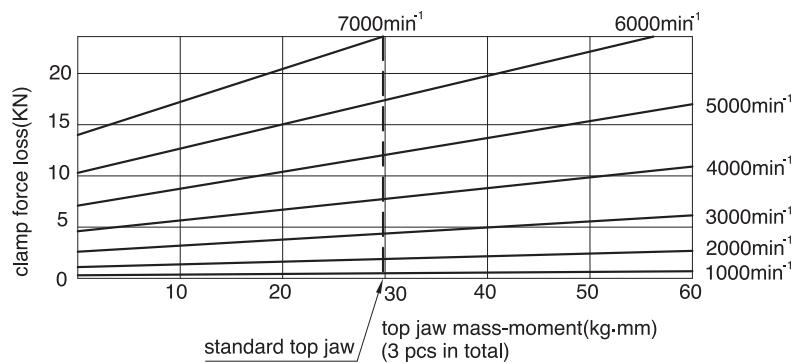


Fig14.
PC-6-46-01

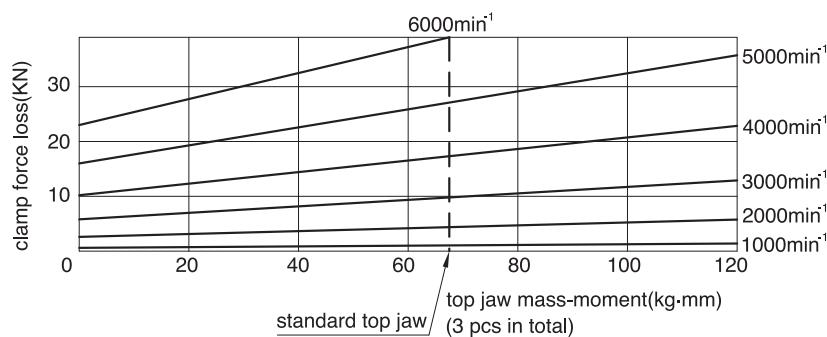


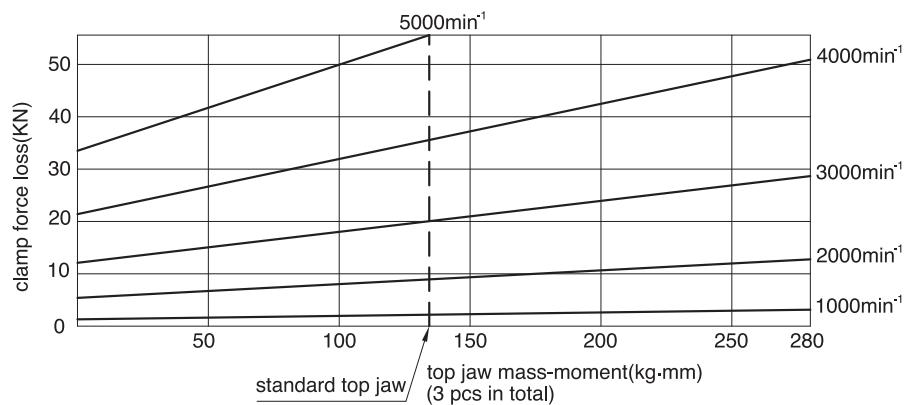
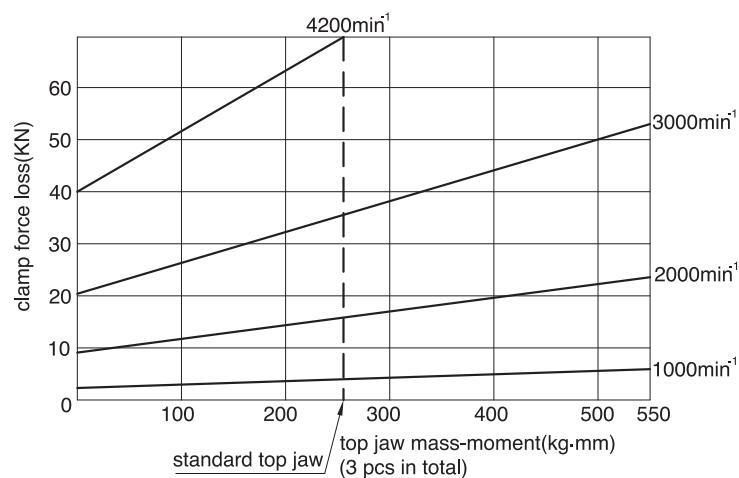
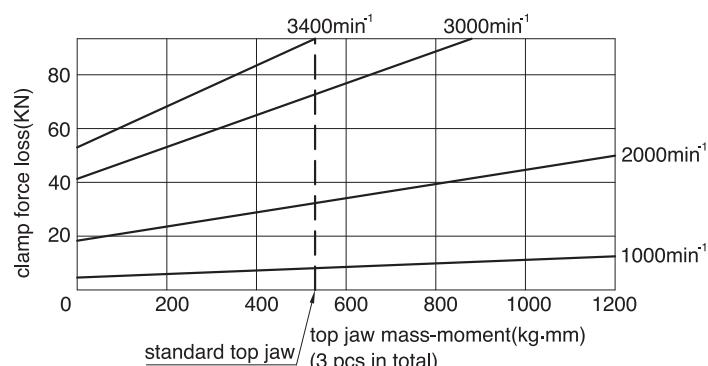
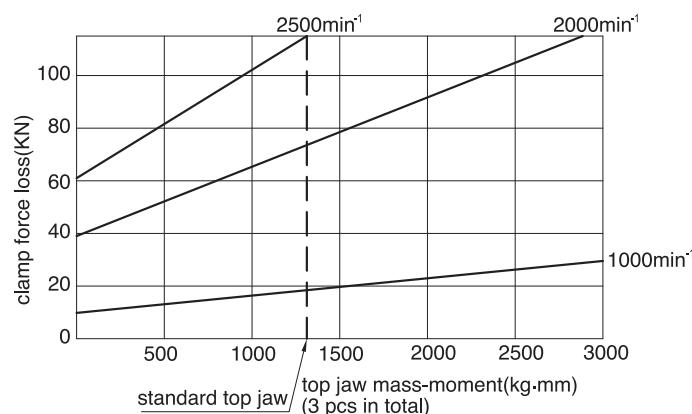
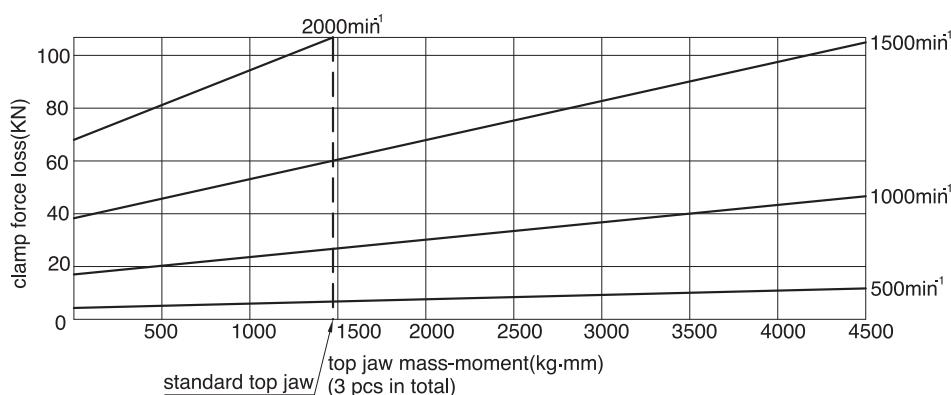
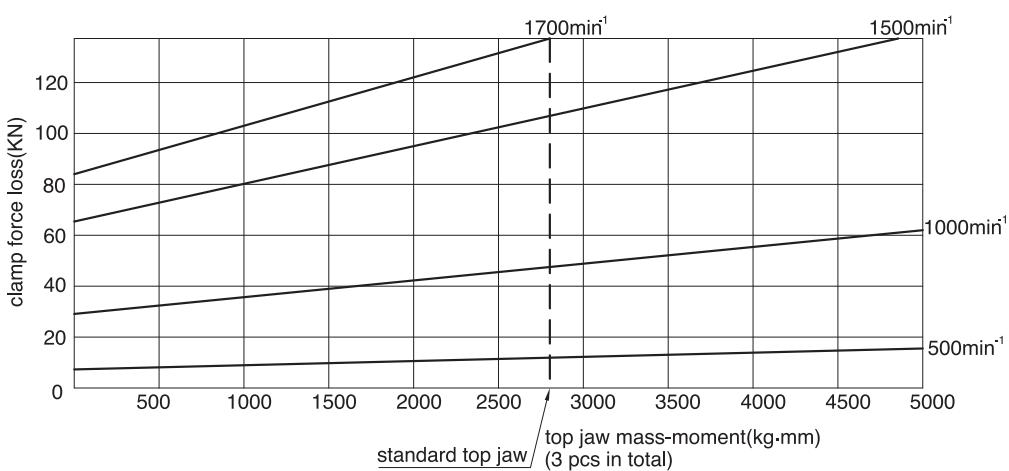
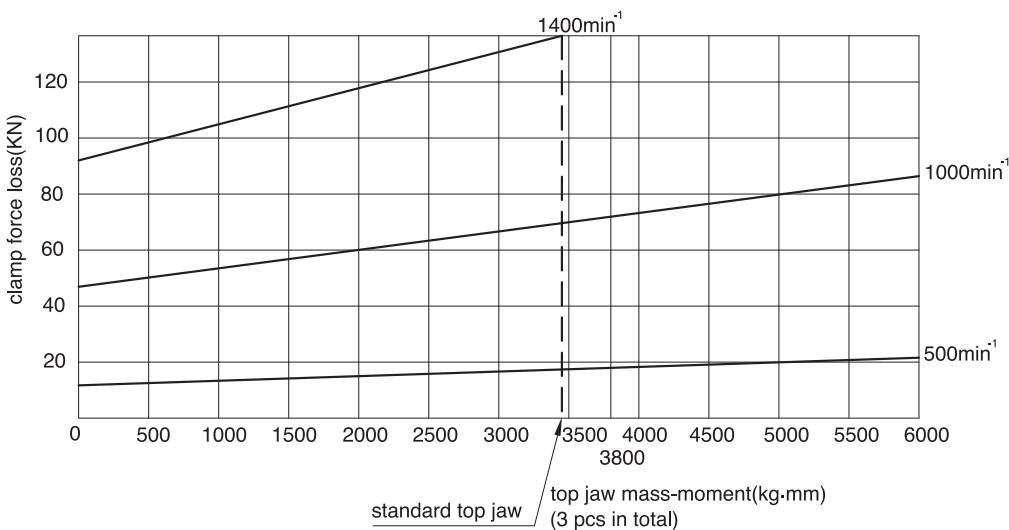
Fig15.
PC-8-52-01Fig16.
PC-10-78-01Fig17.
PC-12-93-01Fig18.
PC-15-120-01

Fig19.
PC-18-165-01Fig20.
PC-21-180-01Fig21.
PC-24-205-01

5-4 THE RELATION BETWEEN WORKPIECE CONTACT POINT AND CYLINDER DRAW BAR FORCE



WARNING

The workpiece grip point must not be higher (from the face of the chuck) than that of the standard top jaw height. If it must be set in a higher position, reduce the cylinder draw bar force in inverse proportion to the height of the clamping position. Operating without reducing the cylinder draw bar force may cause the workpiece to be thrown.

TABLE 5. TOP JAW HEIGHT OF CHUCK MODELS

(Note: Hydraulic pressures are only for "LMC" hydraulic actuator models shown. Other models and other manufacturer actuators will generate different draw bar forces.)

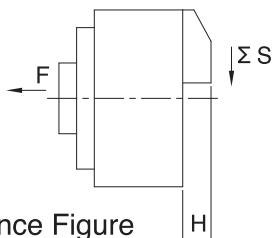


Fig.16 Work Clamp Reference Figure

Chuck Model	Standard Height Of Top Jaw H(mm)
PC-5-34-01	31.5
PC-6-46-01	37.6
PC-8-52-01	39.5
PC-10-78-01	43.1
PC-12-93-01	51.3
PC-15-120-01	66.5
PC-18-165-01	65.5
PC-21-180-01	73.5
PC-24-205-01	73.5

Fig23.
PC-5-34-01

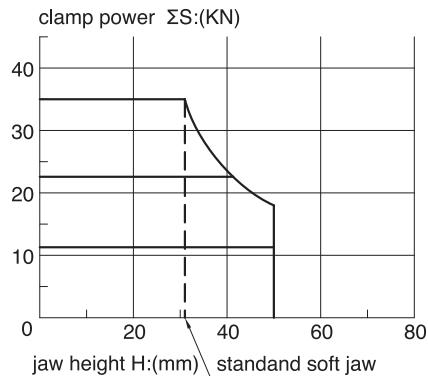


Fig24.
PC-6-46-01

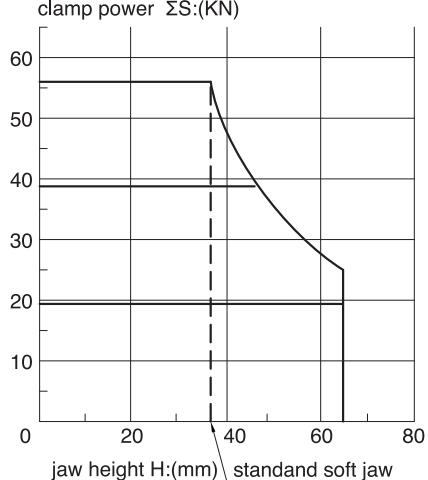


Fig25.
PC-8-52-01

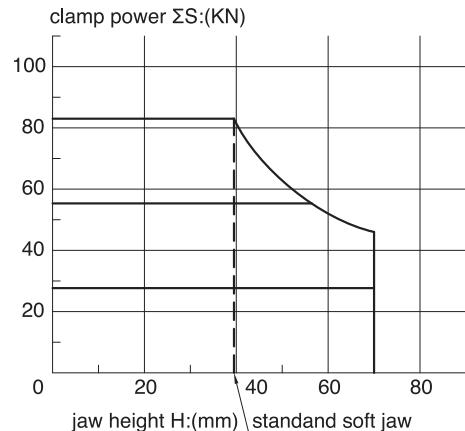


Fig26. PC-10-78-01

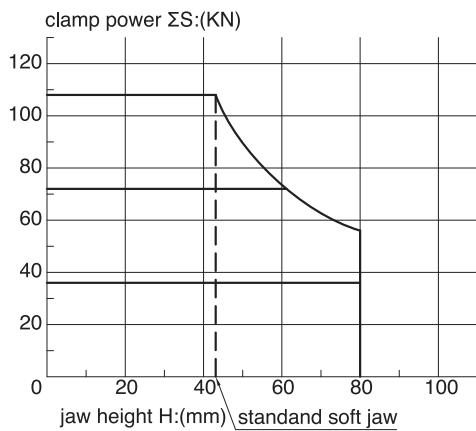


Fig27. PC-12-93-01

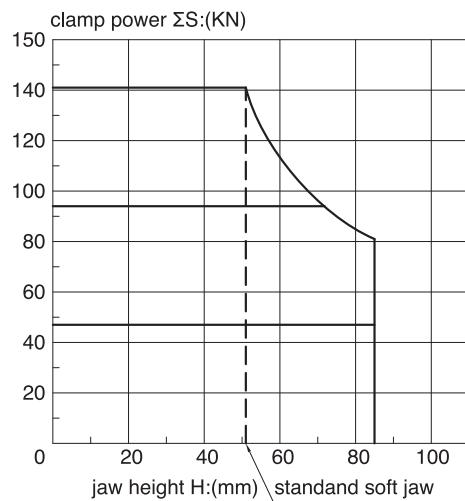


Fig28. PC-15-120-01

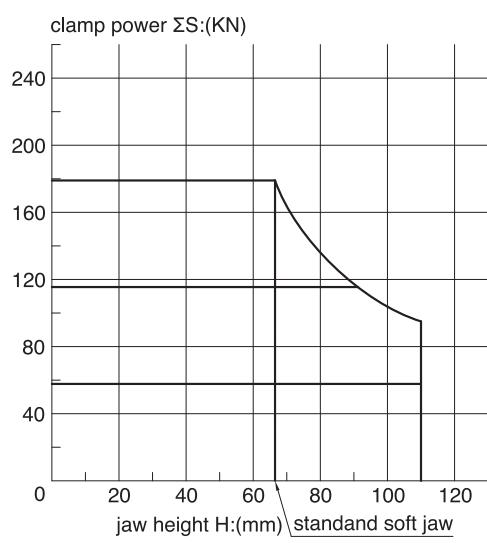


Fig29. PC-18-165-01

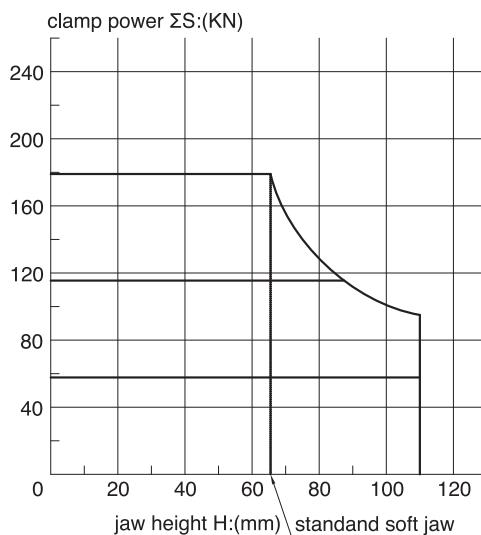


Fig30. PC-21-180-01

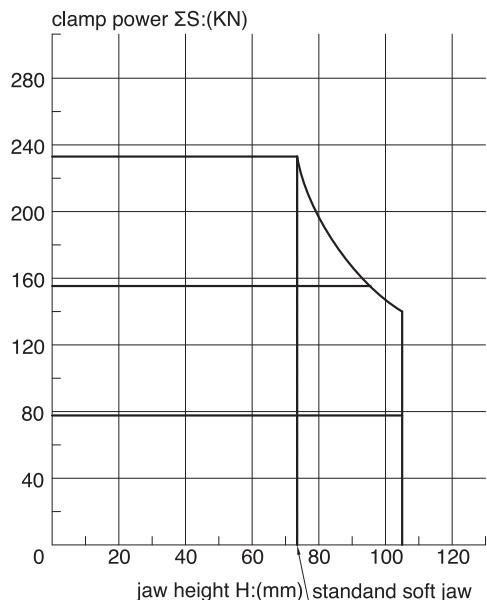
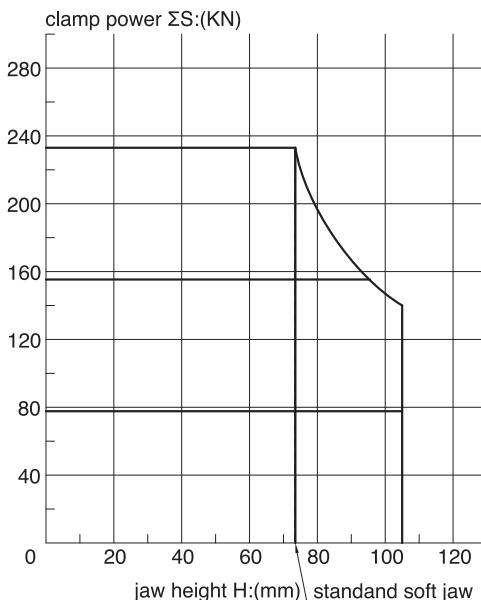


Fig31. PC-24-205-01



5-5 ALLOWABLE WORKPIECE WEIGHT

SEE TABLE 6.

The allowable chuck clamp weight Wkg. should be referred to on Table 6.

FIG. 37 CHUCK CLAMP REFERENCE FIGURE

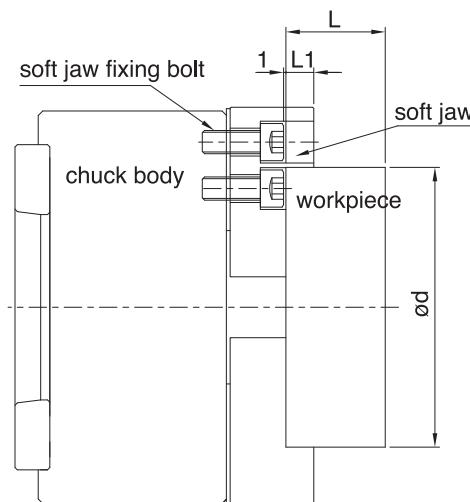


TABLE 6. MAXIMUM CLAMPING WEIGHT TABLE

Type Name	Max. Grip Dia. mm	Jaw Grip Length mm	Max. Workpiece Wt. wkg
PC-5-34-01	135	11.5	5.8
PC-6-46-01	169	12	9.5
PC-8-52-01	210	8	9.8
PC-10-78-01	254	13	23
PC-12-93-01	304	16	41
PC-15-120-01	381	17	68.5
PC-18-165-01	455	20	115
PC-21-180-01	530	23	179
PC-24-205-01	610	23	237.6

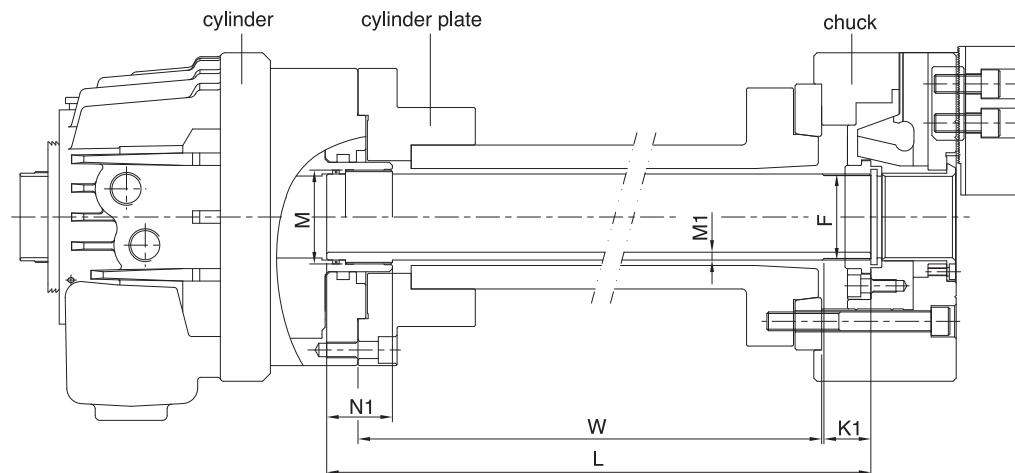
6-1 OPENING THE CRATE AND INSTALLATION PREPARATIONS

- (1) Remove the products from the crate carefully and check the accessories.
- (2) Wipe off the rust proof oil and clean the unit. At this time, be careful not to allow things such as dust, cutting chips, water and so on to enter into the power chuck and hydraulic cylinder.
- (3) Be careful not to nick or dent the steel. The special alloy steel is ground after heat treatment, then finished before assembly.
- (4) The environment with the least amount of dust and best available ventilation should be used for opening the crate.

6-2 MANUFACTURE OF DRAW TUBE

Manufacture the draw tube as the following size table.

FIG. 38 DRAWING OF MANUFACTURE OF DRAW TUBE



WARNING

The draw tube thickness must remain constant. Variations in thickness could cause loss of grip force and the workpiece could possibly be thrown.



ATTENTION

- (1) A loose draw tube nut may cause vibration and reduce the grip force.
- (2) Draw tube O.D. should be same or greater than the thread diameter of the nut. To assure the strength of the tube, use material having the tensile strength which exceeds 380 MPa (39kg f/mm²).
- (3) The concentricity of the draw tube and threads should be 0.05mm or less.

6-3 INSTALLING THE CHUCK TO THE SPINDLE

- (1) Remove the soft jaws.
- (2) Remove cover lid to gain access to draw nut.
- (3) If necessary remove cover to gain access to draw nut wrench slots. (There are models which allow for the removal of the cover and cover lid at the same time.)
- (4) Check to confirm that there is neither rust nor any nicks on the spindle and chuck mounting surface. If any are found, they must be repaired.
- (5) Lower the cylinder pressure below 5 kg/cm² (as low as possible) and move the draw tube forward. The draw tube should be in the most forward position.

**CAUTION**

Please follow the cylinder operation manual.

- (6) Lift the chuck with the eyebolt and align the center of the chuck with the spindle. Rotate the spindle to align with the drive button hole.
- (7) Do not allow grease on the threads of the draw tube or chuck draw nut.
- (8) Engage the draw tube with the chuck draw nut. Use the "T" handle draw nut wrench (from accessory package) and turn draw nut clockwise until it fully engages the draw tube thread.

**WARNING**

Inadequate length thread engagement may cause threads to strip or break. This reduces grip force suddenly and may throw the workpiece.

- (9) Apply and torque the chuck mounting bolts, then remove the lifting eyebolts.
- (10) The chuck mounting bolts should be screwed in evenly. (Unequal torque causes vibration of the chuck.) The mounting bolts should be torqued to the standard torque specification.

**WARNING**

- (1) The mounting bolts should have sufficient strength and be torqued to the standard torque specification.
- (2) The top jaw mounting bolts should be installed with the standard torque. Too little or excessive screw torque causes loosening of bolts or chuck damage. It may also cause the workpiece to be thrown. Please refer to the screw torque table.

TABLE 8. CLAMP TORQUE TABLE

Bolt Size	Clamp Torque N·m (kgf·m)	Bolt Size	Clamp Torque N·m (kgf·m)
M8	38.2 (3.9)	M14	170.6 (17.4)
M10	72.6 (7.4)	M16	250 (25.5)
M12	106.8 (10.9)	M20	402.1 (41)

- (11) As in ITEM 8, insert the mounting wrench and turn clockwise to fully engage (bottom).
- (12) Cycle the chuck (i.e., open and close), confirming that the chuck is running smoothly. Then stop it at the full open position. (Master jaws have reached the circumference of the chuck.)

**ATTENTION**

Careless operation of the hydraulic or pneumatic pressure circuit during the chuck mounting operation may result in personal harm.

- (13) Insert the mounting wrench and turn the screw counter clockwise, thus assuring the clearance between the chuck body and shifter is zero. From this position, turn clockwise 1/3 to 2/3 revolutions to create a clearance of about 0.5mm. Turn wrench counter-clockwise direction to the nearest rotary stop (click).
- (14) Mount the lid. Confirm that the master jaw and lid do not interfere with each other.
- (15) Mount the lid cover.
- (16) After completing the installation, the eyebolt must be removed.

**WARNING**

Remove the eyebolt.

7-1 TRIAL RUNNING

After installing the chuck, please confirm the following point before proceeding with the trial run.

- (1) Did any of the mounting screws loosen?
- (2) Is the chuck lubricated sufficiently?
- (3) Is the actuator unit stroke (push-pull) correct with the chuck open-close?
- (4) Is the hydraulic pressure adjusted to below 5 kg/cm²?
- (5) Is the spindle set in low speed?
- (6) After confirming the points above, stroke to actuator 2 or 3 times (i.e., open and close chuck).
- (7) Slowly increase the hydraulic pressure to maximum recommended. Check for oil leakage and other disorders.
- (8) Check the movement of the chuck jaws.
- (9) Start the spindle at slow RPM setting.
- (10) Slowly increase the RPM of the spindle and confirm whether or not any disorder exists. After confirming the points above and you have not found any trouble, proceed with further operation.



WARNING

* When insufficient balancing exists, the vibration may cause dangerous conditions resulting in bodily harm and machine damage, dangerous accidents may occur.

8-1 MOUNTING THE SOFT JAW

- 8-1-1 Mounting the top jaw to the chuck. Prior to doing so, clean the surfaces on the master jaw, top jaw and T-nut.
- 8-1-2 Locate the top jaw appropriate to the diameter of the workpiece and engage the serrations.

**WARNING**

- (1) Locating the top jaw so that any portion of it extends beyond the circumference of the chuck body may cause the master jaw or T-nut to crack and break. This becomes very dangerous during operation.
- (2) Locate top jaw so that the master jaw is in approximate mid-stroke when workpiece is gripped.

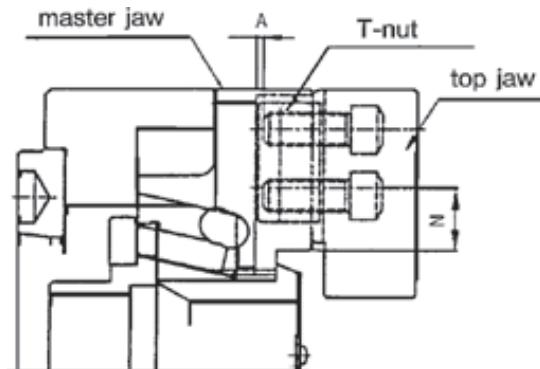
- 8-1-3 After locating the top jaw, assemble the T-nut and tighten the screws. Torque should conform to TABLE 8.

**WARNING**

- (1) Do not start the spindle when T-nut screws are loose! The top jaw may be thrown.
- (2) Torque screws to standard torque specifications. If torque is less than that recommended in TABLE 8, the top jaw of workpiece may be thrown. If torque is too high, the jaw becomes deformed, causing breakage of top jaw or workpiece.

- 8-1-4 Two mounting screws are used per top jaw, and the engagement depth into T-nut is within 2mm of the bottom surface, out from the bottom surface of the T-nut. Assure that the screw does not protrude.

FIG. 39 TOP JAW MOUNTING FIGURE



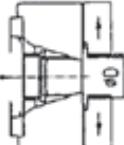
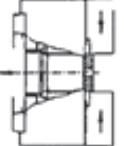
**WARNING**

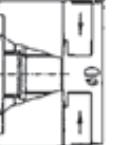
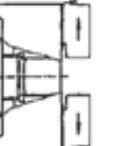
- (1) If the top jaw is mounted with only one screw, both the top jaw and the screw are in danger of breaking. The shallow screw depth of the T-nut causes it to break. Also, when the screw is protruding out from the bottom surface of the T-nut, the top jaw cannot be secure even if you torque the bolt. Failing to torque both screws will cause the top jaw or workpiece to be thrown during machining operation due to the irregular shapes of parts such as castings and torquings, the gripping may vary.
- (2) When gripping the workpiece near the end of the jaw stroke, insufficient gripping power may throw the workpiece.

8-2 THE BORING OF SOFT JAWS

- 8-2-1** Proper selection of top jaw location and serration is important for accuracy of chuck performance.
- 8-2-2** Clamping at midpoint of jaw stroke is important for chuck performance. The internal mechanism is most stable and greatest bearing surface for highest gripping force.
- 8-2-3** PROCEDURE FOR BORING TOP JAW
Refer to TABLE 9. THE PROCEDURE FOR SOFT JAW BORING (pg. 26)

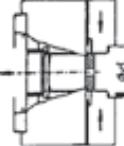
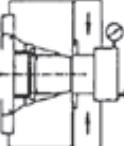
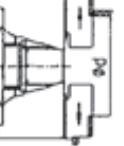
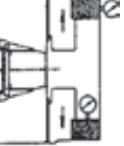
TABLE 9. THE PROCEDURE OF SOFT JAW FORMATION

The Case of Outside Diameter Clamp		
1		Prepare the plug for formation.
2		Open jaws fully to OD position.
3		Form ID of jaws to OD of plug.
4		Clamp the plug in jaws.

The Case of Outside Diameter Clamp		
1		Prepare the ring for formation.
2		Close jaws fully to ID position.
3		Form OD of jaws to ID of ring.
4		Clamp the formation ring in the OD of the jaws. Be careful not to drop this ring.

**CAUTION**

When clamping the plug and ring, be careful not to get fingers caught in it.

5		While clamping the plug, form the jaws to your workpiece. The machining accuracy is H7 and roughness is 6s.
6		The settled pressure in forming is approximately the same as machining the workpiece in forming.
7		After forming, clamp the work-piece and confirm the jaw stroke.
8		After trial cutting, confirm the machining accuracy.
9		The fitting of clamping surface should be clamped as in two (2) positions on the outer diameter and face end.
5		While clamping the ring, form the jaws to your workpiece. The machining accuracy is H7 and roughness is 6s.
6		The settled pressure in forming is approximately the same as machining the workpiece in forming.
7		After forming, clamp the work-piece and confirm the jaw stroke.
8		After trial cutting, confirm the machining accuracy.
9		The fitting of clamping surface should be clamped as in two (2) positions on the outer diameter and face end.

After you have finished fixing the top jaw, and prior to real operation, please read these articles and enforce them strictly during daily operation. We take no responsibility for any accidents caused by disobeying these directions.

- (1) In cold regions or in the winter season, rotate the spindle in low speed as you proceed with warming up.
- (2) In the morning, prior to starting operation, feed oil into the cylinder. Also, repeat the changing motion 2 or 3 times and lubricate the bearings in the hydraulic cylinder. (It is necessary to proceed with these steps before starting up the spindle revolution.)

**WARNING**

Prior to operation, confirm that the necessary pneumatic or hydraulic pressure is supplied to the cylinder.

- (3) Change the pressure setting in accordance with the workpiece shape and cutting conditions. Clamping of thin shaped parts which cause a high pressure setting may deform the workpiece.
- (4) The T-nut used for fixing the soft jaw of the power chuck should be set to avoid breaking away from the master jaws.
- (5) High speed running of the chuck reduces clamp power. Therefore, please refer to article 5-2-5 and the clamp power diagram (pgs. 9, 10), and safely activate the cutting operation.
- (6) When the machine rests for a long period of time, remove the workpiece from the chuck.

**WARNING**

Leaving the workpiece in a clamped state may result in it falling and damaging the machine.

9-1 THE PRECAUTIONS FOR USAGE



WARNING

- (1) Grip force will change in response to a change in soft jaw.
- (2) Do not use heavier soft jaw than standard jaw.
- (3) In the case of an unbalanced workpiece, as the centrifugal force caused by eccentricity of mass activates to the jaw, operate in low speed.
- (4) Using another maker's soft jaw is dangerous because it results in innaccuracy. Due to master jaw deformation by bad engagement or lack of clamp power, the workpiece will be thrown.
- (5) Do not use a top jaw which has a different serration than the master jaw.
- (6) Prior to operation, confirm that the top jaw and locator do not interfere with each other in low speed revolution. Interference causes the two to collide with each other, which may lead to breakage.

9-2 THE PRECAUTIONS FOR OPERATION



WARNING

- (1) Unless the protective cover has been placed over the machine completely, breakup of the workpiece can cause injury.
- (2) If the back end surface of the workpiece is apart from the locator end surface of the chuck, the revolving center of the workpiece inclines to the revolving center of the chuck, the wrought material having gate or burr pushes out, or the depth of cut comes over the intended value, the workpiece will be thrown.
- (3) You must build up the safety cover or barricade so that no one can ever reach around the revolving part.



ATTENTION

Jigs and locators should be fixed with bolts strong enough to protect against breakage due to the centrifugal force.

10-1 MAINTENANCE AND INSPECTION, CLEANING

The main cause of a decrease in chuck life is insufficient lubrication. The chuck should be lubricated with the pressure durable grease from the grease nipples on each master jaw. It should be applied every 8 hours. When using the water soluble cutting oil, increase the number of supply times. The recommended grease is as follows.

TABLE 10. THE RECOMMENDED GREASE TABLE

KYODO SEKIYU	RESONIC M1
SHELL OIL	LETINACS AM
THREE BOND	THREE BOND 1901
NOK CLEWVER	ARTENP Q NB50

For others, we recommend GREASE in LITHIUM SYSTEM containing 5% DISULPHIDE MOLIBDENUM.



WARNING

- (1) In order to use the chuck in its best condition for a long period, it is important to supply the lubricating oil. Insufficient lubrication causes disorder, reduction of clamp power, extraordinary wear and seizure, and so on. These factors lead to the reduction of clamp power and cause the workpiece to be thrown.
- (2) Using inadequate oil not only brings about rapid wear and lack of clamp power, but also throws the workpiece during cutting operation.

10-1-2 The chuck should be taken apart and cleaned once every half year. The abstract of break up and assembly is described in the following. At the same time, inspect the disorders of other parts.



ATTENTION

The chuck should be taken apart and cleaned once every half a year. (For casting parts, once every 2 months.)

10-1-3 The accumulated cutting chips, dust on the jaw fixed in groove, and serration should be removed and cleaned properly.

10-1-4 Accumulated chips and so on cause trouble of movement for the hollow type power chuck and cylinder. They must be cleaned thoroughly.

10-1-5 At the completion of operation, clean the chuck surface thoroughly.



WARNING

Accumulated chips inside the chuck reduce clamp power and produce lack of jaw stroke. This causes the workpiece to be thrown.

10-2 MAINTENANCE (ABSTRACT OF BREAK-UP & ASSEMBLY)

10-2-1 Remove the chuck from the machine spindle.

10-2-2 Take apart the chuck. (Refer to the construction figure and parts list table on pg. 6).

- (1) Remove rear plate bolts, 13
- (2) Take off rear plate 12. Utilizing two taps for the jack, record the rear plate fixed position. (There are drive pin holes in the rear of the third jaw.)
- (3) Remove safety pins (bolts), 26. (If present)
- (4) Draw off plunger nut 6, draw screw 7 and plunger 2 all at once, holding the draw screw.
- (5) Take off bolt 16. Be careful not to lose steel ball 14, or compression coil spring 15 between the draw screw and plunger nut.
- (6) Take out the master jaw.

As above, the break-up is complete.

10-2-3 Assembly of the chuck.

- (1) Fix the master jaw. Match the jaw number on the chuck body with the jaw number on the master jaw.
- (2) Coat with grease the outside of the draw screw which contacts the receive plate.
- (3) Assemble the receive plate with the draw screw.
- (4) Put the compression coil spring and steel ball into the plunger nut, and fix the draw screw with the plunger nut.
- (5) Install screw, 16
- (6) Install bolts, 11, confirm that the draw screw could be easily turned by hand.
At the same time, confirm that the ratchet stop actuates with the action of the steel ball, with the sound of “click, click”.
- (7) Put the above assembly into chuck body 1. As “1” is marked in front of the plunger, fix this groove with the first master jaw. Sufficiently coat grease around the shifter.
- (8) Insert safety bolt, 26 (If present)
- (9) Be careful of the direction of the rear plate.
- (10) Install bolts, 13

As above, the assembly is complete.

Disorder Phenomena	Causes	Counter Measure
Insufficiency of stroke	Contains too much cutting chips. Loosening of draw tube.	Break up and clean. Take out the draw tube and reclamp.
Master jaw motion is slow or it does not move.	Seizure on sliding surface of master jaw.	Supply oil, break up and repair, or exchange parts.
Slippage of clamped workpiece.	Lack of master jaw stroke.	When clamping the workpiece, set the master jaw in the middle of the stroke.
	Lack of clamp force.	Confirm that the settled oil pressure is correct.
	Formed diameter of top jaw does not match the work-piece diameter.	Following the correct method, reform the cut again.
	Too much cutting force.	Following specifications, check the cutting conditions.
	Lubrication on the master jaw sliding surface has dried up.	Supply oil and actuate open and close motion.
	Revolution is too high.	Slow down the revolution until you get the suitable clamp power.
Inaccuracy.	Run out of circumference of chuck.	Confirm run out of circumference and face end reclamp.
	Fixed dusts on the jaw serra-tion part.	Cleaning.
	Insufficient clamp of top jaw fixing bolts.	Reclamp with regular torque.
	Incorrect forming of top jaw.	Check that the forming plug is parallel to the chuck end face. Confirm oil pressure at forming time, and surface roughness of formed part.
	Top jaw height is too high and the top jaw bolts are de-formed or elongated.	Lower the top jaw height.
	Over clamp force, deformed the workpiece.	Slow down clamp force and check cutting conditions.

THE HYDRAULIC POWER CHUCK ACCESSORIES**NAME**

1	Water Proof Cover	1
2	Standard Soft Jaw	3
3	Soft Jaw T-Nut	3
4	Soft Jaw Bolt	6
5	Chuck Mounting Bolt	6
6	Hex wrench for chuck mounting bolt and soft jaw bolt	6
7	Joint handle (Draw Screw Wrench)	each 1

≡MEMO≡



LMC Workholding

Est. 1916

Logansport Machine Company

LMC Workholding

P.O. Box 7006 • 1200 West Linden Ave.
Logansport, Indiana 46947-7006
Phone 574-735-0225 • Fax 574-722-6559
E-mail: info@LMCworkholding.com

LMCworkholding.com



Hydraulic
Steady Rests

Manual
Steady Rests

Standard Chucks
& Cylinders



Specialty
Workholding

Face Drivers
& Centers

Wheel Chucks
& Cylinders

