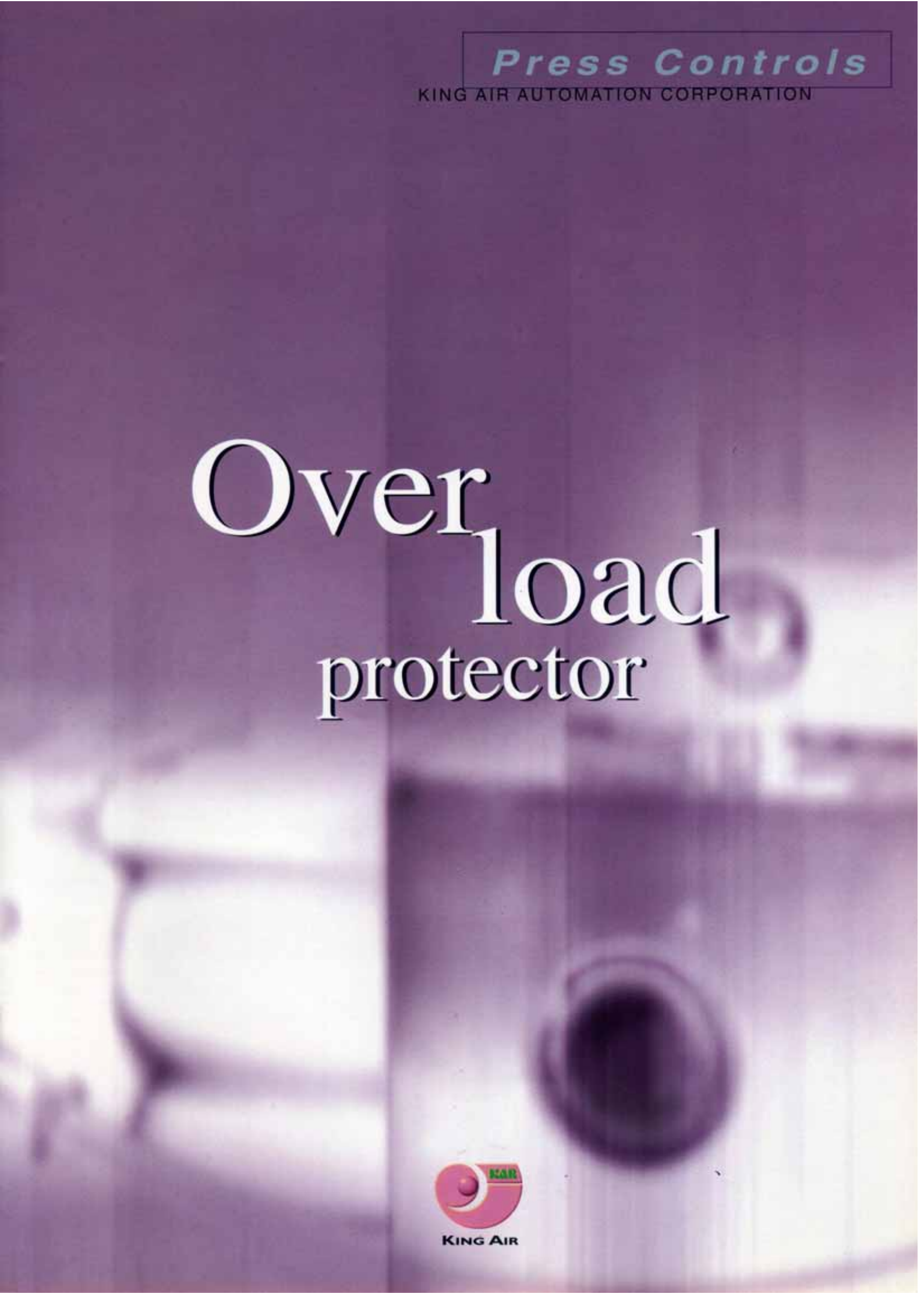
Press Controls

KING AIR AUTOMATION CORPORATION

Over load protector



KING AIR

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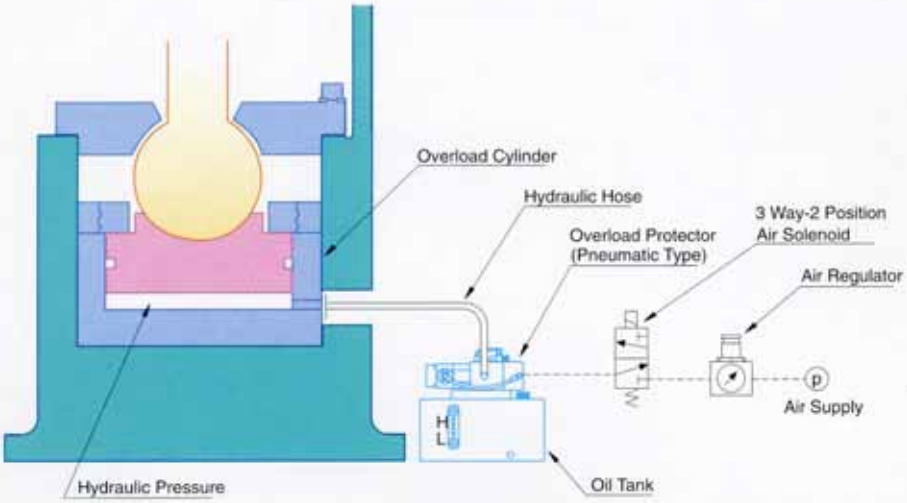
OVERLOAD PROTECTOR 沖床用油壓超負載保護器



Application

- The King Air overload protector is equipped with a press to keep the pressure of the hydraulic cylinder inside the slider From overloading.
- The overload protector can quickly compensate to maintain the normal working pressure when the pressure is not enough .
- As soon as the pressure is overloaded the pressure is quickly released to protect the press, molds, etc.

Description

- The King Air overload protector is composed of the booster driven by air, highly sensitive overload relief valve, and the sensitivity switch.
- The hydraulic booster, driven by clean air, is used to maintain the required hydraulic pressure during operation.
- The air-driven hydraulic booster has two kinds of pressure ration to offer the different working pressure.
- There are two methods, the penumatic type and the spring type, for adjusting the overload pressure of the overload protector .
- The sensitivity switch is used it stop the press as soon as the highly sensitive overload relief valve operates.

Function

- **Quick Response**
  As soon as the overload pressure is detected, the overload relief valve must release within 1/1000 second.
- **Stable Overload Pressure**
  The relief valve of the hydraulic overload protector detects the overload pressure within 5% tolerance.
- **High Quality Sensitivity Switch**
  The switch is durable and the contact point is accurate.
- **Easy Adjustment**
  It is easy to adjust the overload pressure of the overload protector.
- **Dimension and Weight**
  Compact, light, and easy to install.

應用：

- KING AIR 的沖床用油壓超負載保護器係裝置於沖床上，檢測沖床滑塊內部油壓缸的壓力。
- 當油壓壓力不足時，可以快速補足壓力，以保持沖床正常沖壓壓力。
- 當油壓壓力產生超負載的情況時，可以瞬間洩放出油壓壓力，以保護沖床機構和模具的使用壽命。

說明：

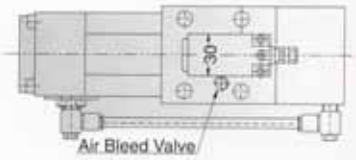
- KING AIR 的沖床用油壓超負載保護器，是由 (1) 空壓驅動油壓增壓泵 (2) 高精密超負載油壓壓力洩放閥 (3) 感應開關等三部分所構成。
- 空壓驅動油壓增壓泵是以空氣為動力源，將油壓增壓至所須的工作壓力，有二種增壓比可供選擇。
- 高精度超負載油壓壓力洩放閥的壓力設定方式有二種 (1) 使用空氣壓力控制 (2) 彈簧調整。
- 感應開關是使用在當高精密超負載油壓壓力洩放閥被啓動時，即時通知沖床停止沖壓作業。

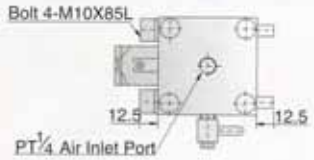
功能：

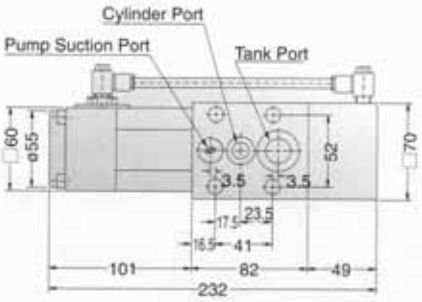
- 當超負載保護器的油壓壓力洩放閥被啓動時，其洩放壓力油的時間在 1/1000 秒【 1 msec 】以內
- 超負載油壓壓力的檢測精度在 5% 以內。
- 感應開關耐沖擊且接點動作正確。
- 超負載油壓壓力的調整，簡單確實。
- 體積小、重量輕、方便按裝。

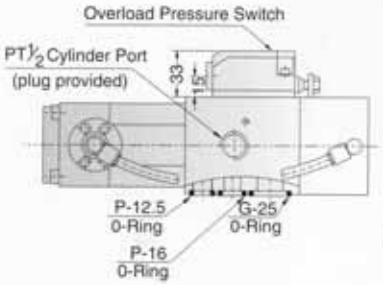
KING AIR

Outline Dimensions: LA-257 LA-507

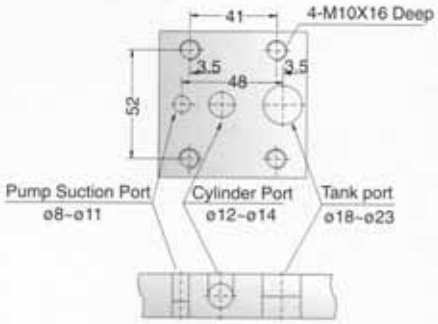








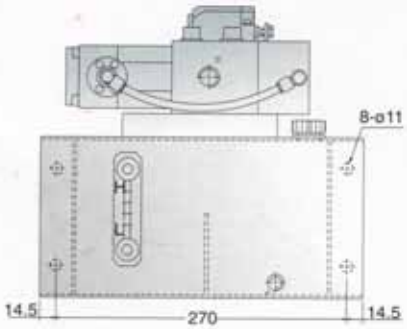
Manifold Mounting Hole

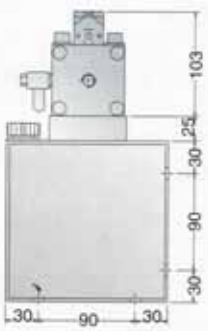


Specifications

Model No. 型式	Overload Protector Only		Overload Protector With Reservoir Tank	
	LA-257	LA-507	LA-257-T	LA-507-T
Medium 使用流體	Compressed Air, Filtered 〔 lubricated or unlubricated 〕			
Air Pressure 使用空壓壓力	2~5.7 〔 kg/cm² 〕			
Air Consumption 空氣消耗量	180 Nl/min			
Operation Noise 噪音	Less than 76 dB			
Hydraulic Fluid 液壓油	ISO-VG-32 or equivalent			
Discharge Pressure 增壓泵吐出壓力	Air Pressurex24	Air pressurex42	Air pressurex24	Air pressurex42
Trigger Pressure 超負載設定壓力	Air Pressure x70 (Theoretical)			
Narmal Operating Pressure 常用超負載設定壓力	200~350 〔 kg/cm² 〕			
Flow Rate OF overload 超負載保護器洩放流量	13000cm³/s			

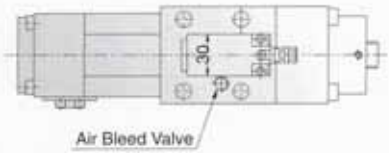
Outline Dimensions: LA-257-T LA-507-T

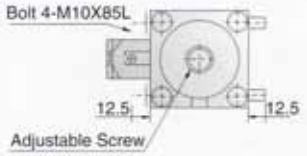


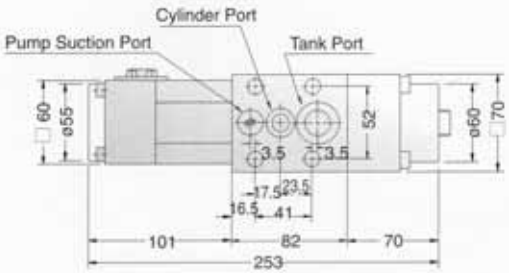


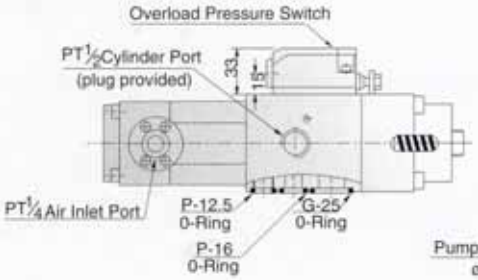
KING AIR

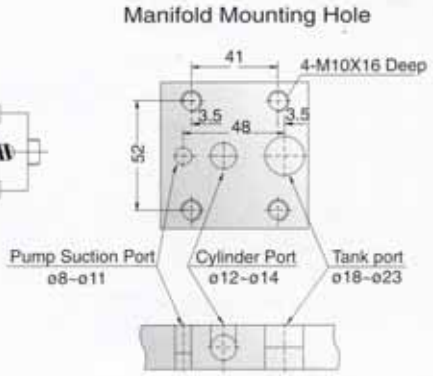
Outline Dimensions: LS-257 LS-507







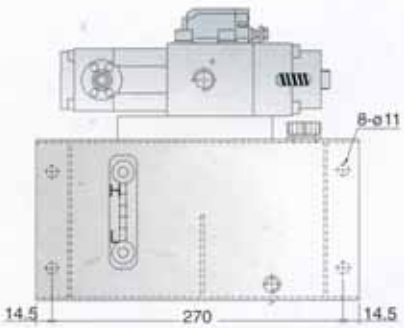


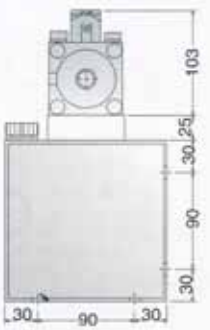


Specifications

Model No. 型式	Overload Protector Only		Overload Protector With Reservoir Tank	
	LS-257	LS-507	LS-257-T	LS-507-T
Medium 使用流體	Compressed Air 〔 lubricated or unlubricated 〕			
Air Pressure 使用空壓壓力	2~5.7 〔 kg/cm² 〕			
Air Consumption 空氣消耗量	180 Nl/min			
Operation Noise 噪音	Less than 76 dB			
Hydraulic Fluid 液壓油	ISO-VG-32 or equivalent			
Discharge Pressure 增壓泵吐出壓力	Air Pressurex24	Air pressurex42	Air pressurex24	Air pressurex42
Trigger Pressure 超負載設定壓力	Spring Control			
Narmal Operating Pressure 常用超負載設定壓力	200~350〔kg/cm²〕			
Flow Rate OF overload 超負載保護器洩放流量	13000cm³/s			

Outline Dimensions: LS-257-T LS-507-T



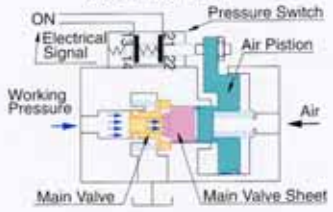


KING AIR

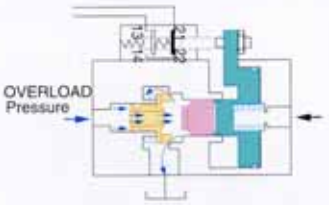
THEORY OPERATION 作動原理

Pneumatic Type:

NORMAL PRESS OPERATION
沖床正常使用狀態



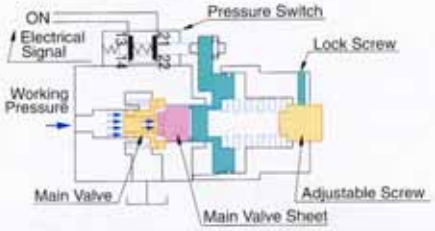
OVERLOAD PROTECTOR TRIGGERED CONDITION
過載保護裝置壓力洩放狀態



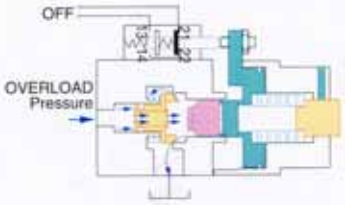
CYLINDER PRESSURE DROP DOWN
過載油壓缸壓力停止狀態

Spring Type:

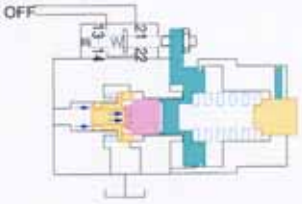
NORMAL PRESS OPERATION
沖床正常使用狀態



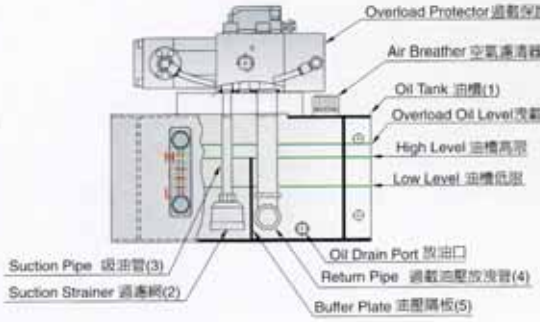
OVERLOAD PROTECTOR TRIGGERED CONDITION
過載保護裝置壓力洩放狀態



CYLINDER PRESSURE DROP DOWN
過載油壓缸壓力停止狀態



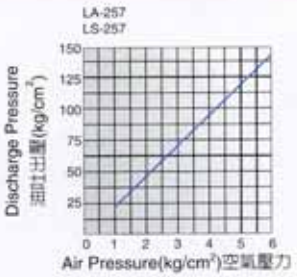
RESERVOIR TANK 油箱配置

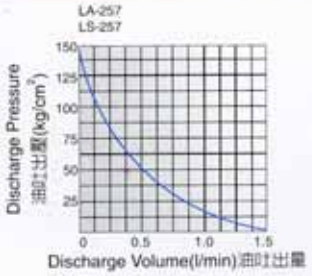


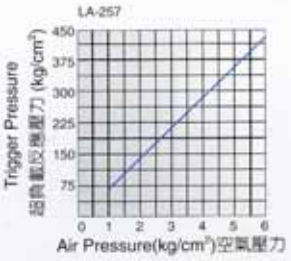
(1) Over 3 times the cylinder capacity.
(2) Over120 mesh, over 2.5 liter/min .
(3) Thick wall pipe which can withstand high shock and vibration should be used.
(4)ⓐ Thick-walled pipe should be used to withstand strong shock and vibration.
ⓑ Tip of the tupe should be mounted with a Tee or cut in 45 angle to slow down oil flow .
(5) In order to separate the return oil from the suction pipe, buffer plate shall be provided in the tank.
(6) The oil supply inlet cover should have a air breathing hole to exhaust air rapidly for the case that high volume of oil returns to the tank by overloading function . The hole diameter should be over 8mm.

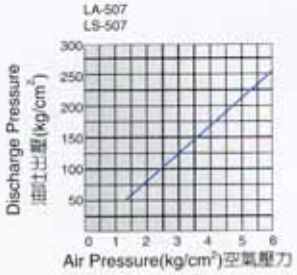
(1) 油槽容量須大於過載油壓缸容積的 3 倍以上。
(2) 油過率濾網須大於 120 目以上，流量須大於 2.5 ℓ/min 。
(3) 吸油管須管壁與管壁厚耐高壓力沖擊及振動。
(4)ⓐ 洩油管須管壁耐厚高壓力沖擊及振動。
ⓑ 洩油管在管的末端可以使用 T 型管或切成 45° 角以減低流量沖擊。
(5) 減低回流油對吸油管的沖擊所以隔板是必須的。
(6) 油入口蓋須有一通氣孔，且口徑須大於 8mm，以利大量回流油時快速排出空氣。

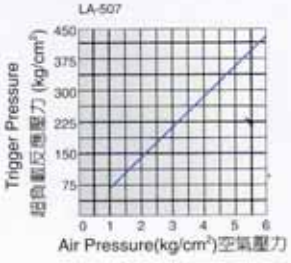
CHARACTERISTIC CHART 特性曲線





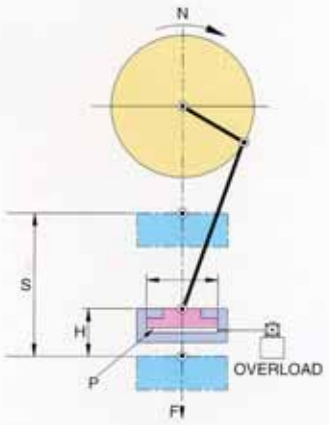






KING AIR

MATHEMATICAL DERIVATION



一、 Confrom to the qualitions of the press when Using a overload

F: Press Rated Capacity(ton)
P: Overload Trigger Pressure 〔 kgf/cm² 〕
H: Press rated capacity generation point above bottom of the stroke(distance)(mm)
S: Stroke Length (mm)
N: Press stroke per minute (SPM)
A: Overload Cylinder Area (cm²)
V: Press ram decending speed at rated . Press capacity generation point .(cm/sec)

二、 Overload Trigger Capacity 【 C 】:

- C= F x1.0~1.2
  Usually 1.1(10% up) is recommended.

三、 Overload Trigger Pressure 【 P 】:

- $P=\frac{\text{Overload Trigger Capacity 〔 kgf 〕}}{\text{overload Cylinder Area 〔 cm² 〕}}=\frac{C}{A}$〔 A 〕
- P= Air Pressure (Pa)x70..... 〔 B 〕
- P should be calculated by above equations 〔A〕 and 〔B〕.
- Air pressure should be as higher as possible.
- Overload trigger pressure (P) should be selected as higher as possible. (example:350kg/cm²)
- It is benefitial to standardize pressure of all the presses .

四、 Flow Rate of Overload Cylinder 【 Q 】:

- Q=AxV $V=N\sqrt{SH-H^2}/87.5$
- Example of Calculation :
- Conditions: Press capacity : 130 ton
  Stroke per minute 〔 N 〕: 50 spm
  Stroke length 〔 S 〕: 200mm
  Rated capacity generation point
  Above bottom of the stroke 〔 H 〕: 5mm
  Overload cylinder dia 〔 A 〕: 230mm

- **Overload Trigger Pressure 【P】:**

$P=\frac{C}{A}=\frac{130000kgfx1.1}{23^2x\ \pi/4cm^2}\fallingdotseq 345\ kgf/cm^2$

P= 〔 Pa 〕x70=4.93 kgf/cm²x70 ≒ 345kgf/cm²
★ Overload Trigger Pressure : 345kgf/cm²
★ Air Pressure : 4.93kgf/cm²

- **Overload Flow Rate Check:**

$V=50\sqrt{200x5-5^2}/87.5=17.8$ cm/sec
$Q=23^2x\ \pi/4x17.8=7395\ cm^3/sec$
★ The flow rate of the overload cylinder should be less than of the overload protector.
★ Then, The Model No. to be selected is Series LA or LS.

理論依據

一、使用超負載保護器時沖床應符合下列使用條件之要求。

F: 沖床能力：沖床能夠產生之最大沖壓壓力（統稱沖床能力）(ton)
P: 超負載設定壓力：使負載保護器釋放開作動之壓力 (kgf/cm²)
H: 能力產生位置：從下死點算起能夠產生最大沖壓壓力之高度 (mm)
S: 行程長度：滑塊一行程運動距離 (mm)
N: 行程數：一分鐘內滑塊的行程次數 (SPM)
A: 超負載油壓缸面積〔 cm² 〕
V: 能力產生點滑塊的速度 (cm/sec)

二、啓動超負載保護器的動能【 C 】:

- C=Fx1.0~1.2
  通常以 1.1 倍來計算

三、超負載保護器設定的壓力【 P 】:

- $P=\frac{\text{啓動超負載保護器的動能〔 kgf 〕}}{\text{超負載油壓缸的面積〔 cm² 〕}}=\frac{C}{A}$ ..... 〔 A 〕
- P= 空壓壓力〔 Pa 〕x 70 ..... 〔 B 〕
- 由〔 A 〕〔 B 〕即可計算出超負載保護器設定的壓力〔 P 〕，和空壓壓力〔 Pa 〕
- 空壓壓力儘量提高。
- 超負載保護器設定的壓力最好選擇高的。（例如： 350kg/cm²）
- 各種不同型式的沖床最好能將過負載保護器設定的壓力標準化。

四、超負載時油壓缸洩放的流量【 Q 】:

- Q=AXV $V=N\sqrt{SH-H^2}/87.5$
- 計算舉例：
- 設定條件：沖床能力：130 ton
  每分鐘行程數〔 N 〕：50 spm
  行程長度〔 S 〕：200mm
  能力產生位置〔 H 〕：5mm
  超負載油壓缸直徑〔 A 〕：230mm

- **超負載保護器設定的壓力【 P 】:**

$P=\frac{C}{A}=\frac{130000kgfx1.1}{23^2x\ \pi/4cm^2}\fallingdotseq 345\ kgf/cm^2$

P= 〔 Pa 〕x70=4.93 kgf/cm²x70 ≒345kgf/cm²
★超負載保護器設定的壓力： P=345kgf/cm²
★空壓壓力： Pa=4.93kgf/cm²

- **超負載時油壓缸洩放的流量：**

$V=50\sqrt{200X5-5^2}/87.5=17.8$ cm/sec
$Q=23^2X\ \pi/4X17.8=7395\ cm^3/sec$
★超負載時油壓缸洩放的流量〔 Q 〕必須小於超負載保護器洩放流量。
★根據上列計算，超負載時油壓缸洩放流量小於超負載保護器洩放流量，所以 LA 系列或 LS 系列都可以選擇使用。

肯岳亞股份有限公司
KING AIR AUTOMATION CORPORATION

40849 台中市南屯區文山北巷1-5號
40849 No. 1-5 Wenshan N. Lane Nantun District
Taichung Taiwan R. O. C.
TEL : 886-4-23876060 FAX : 886-4-23876161
http://www.king-air.com.tw
E-mail:kingair@ms22.hinet.net